

SOUTHERN POWER AND INDUSTRY

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SEPTEMBER, 1954

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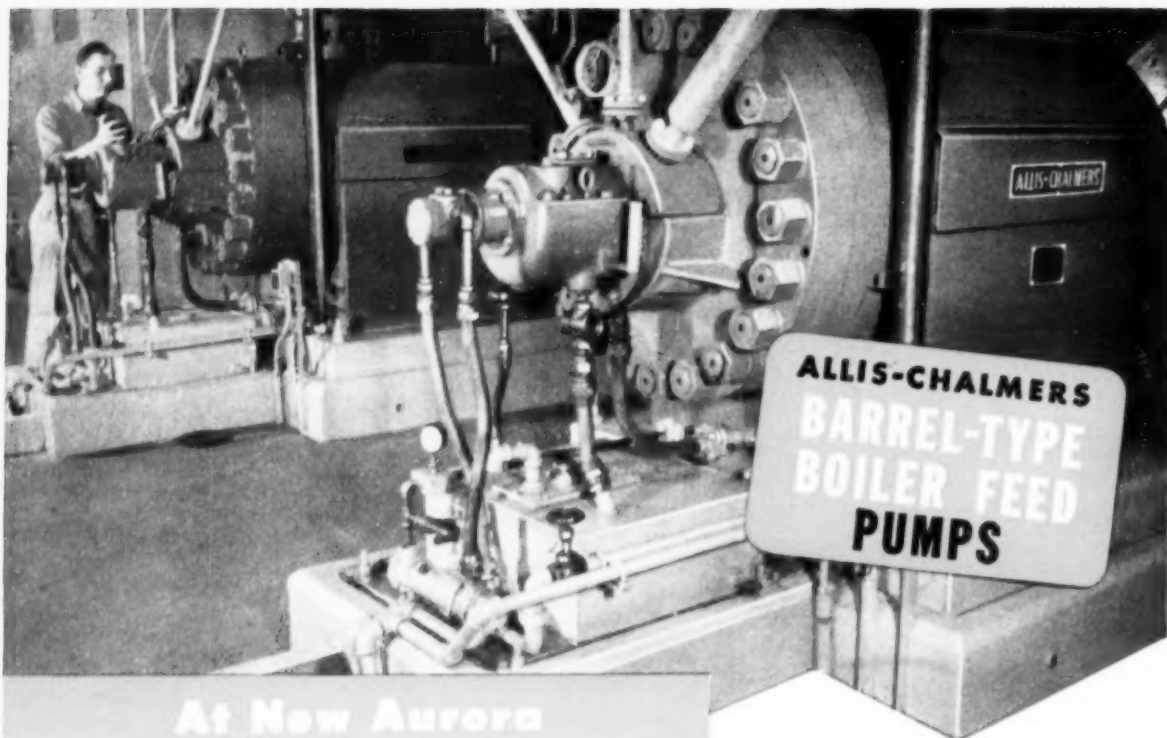
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**ATOMIC ENERGY Will
Be BIG BUSINESS
Starts page 74**



**At New Aurora
Steam Electric Station...**

The four Allis-Chalmers pumps at the Aurora Steam Electric Station — installed two to a power unit — are 6 x 6, 9 stage, rated 475,000 lbs./hr., 1035 gpm at a total discharge pressure of 1585 psig. Water temperature is 300 F.

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THE NEW 88,000-KW AURORA STEAM ELECTRIC PLANT at Aurora, Minn., is a model of modern design and efficiency. Equipment was carefully chosen for its ability to provide extra dependable, low-cost operation.

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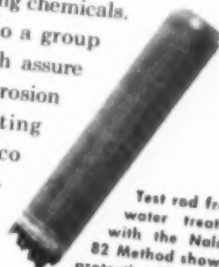
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Volume 72

Number 9

Forest of Facts on *Nalco*® RECIRCULATING WATER TREATMENT

NALCO Laboratories' continuous research program has gathered this forest of facts about protecting recirculating water systems. In the search for the most effective and economical formula, the metal rods shown have been rotated in all types of recirculating waters and treating chemicals. Results pointed the way to a group of Nalco Treatments which assure users against scale and corrosion in virtually any recirculating waters. For details on Nalco Treatment to fit your particular system, call your Nalco Representative, or write direct.



Test rod from water treated with the Nalco 82 Method shows protective film and freedom from any scaling or corrosive attack.

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- Total alkalinity of makeup more than 40 ppm.
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- Where non-toxic waste water is required.

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SEPTEMBER
1954

Vol. 72
No. 9

NBP



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Facts and Trends

FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES

September, 1954

- **BARK BURNING ADVANCES** are demonstrated in the new Hollingsworth & Whitney boiler installation in Mobile, Alabama. Design incorporates a Combustion Engineering steam generating unit of a type developed specifically for this service.

Design steam capacity burning bark alone is 130,000 lb/hr; burning gas alone, 160,000 lb. Combination operation gives 100,000 lb from bark and 60,000 lb from gas, or a total of 160,000 lb/hr. Shredded bark is introduced 15 ft above the grate, and dries as it falls into a turbulent zone where much of it burns in suspension.

Predicted performance contemplates the generation of 2.45 lb of steam per pound of 50% moisture bark, at 130,000 lb/hr steam load. This represents an efficiency of 65.8%. Considering that the inherent loss due to moisture in the fuel is 22%, this is excellent performance. Technical details are reported in this issue of SP&I.

- **WATER CONDITIONING GADGETS**--Hall Laboratories, Inc., is offering reprints of a report containing observations made by its service engineers concerning numerous "cure-alls" claimed by their manufacturers to prevent scale and corrosion in industrial boilers, heat exchangers, evaporators, and water piping.

Gadgets are defined as special devices requiring substantially no technical control which are alleged to treat water by nonchemical means to prevent scale, corrosion, and other troubles encountered in the industrial use of water. Gadgets are discussed in two categories --those with an external electrical circuit and those without such a circuit.

Eight page reprint, available free of charge, also discusses what course of action is practical for the man-in-the-plant besieged annually by a new promoter with a new gadget. For your free copy of "Practical Performance of Water-Conditioning Gadgets" write Hall Laboratories, Inc., Hagan Building, Pittsburgh 30, Penna.

- **ATOMIC POWER TODAY** is not a big enough business to warrant an enormous effort and still make a profit. Yet, more can and should be done. Atomic power, as distinguished from bombs and similar uses of the atom, is going to be a BIG BUSINESS. Those who contribute and thereby accumulate the "know-how" of the apparatus required will find a field that will pay substantial benefits in the near future.

In this issue of SP&I, the assistant manager, atomic power division of Westinghouse, reports on ATOMIC ENERGY AND WORLD FUEL RESERVES. His comments on energy demand, current and future sources lead to one choice. We are compelled to develop atomic power commercially, regardless of comparative costs. There is no other way to close the widening gap between energy reserves and future energy requirements. For similar views check Industry Speaks in this issue where Edgar H. Nixon, president of Middle South Utilities, Inc., comments on "The IF in Peacetime Atomic Power is No Longer Present."

(Continued on page 6)

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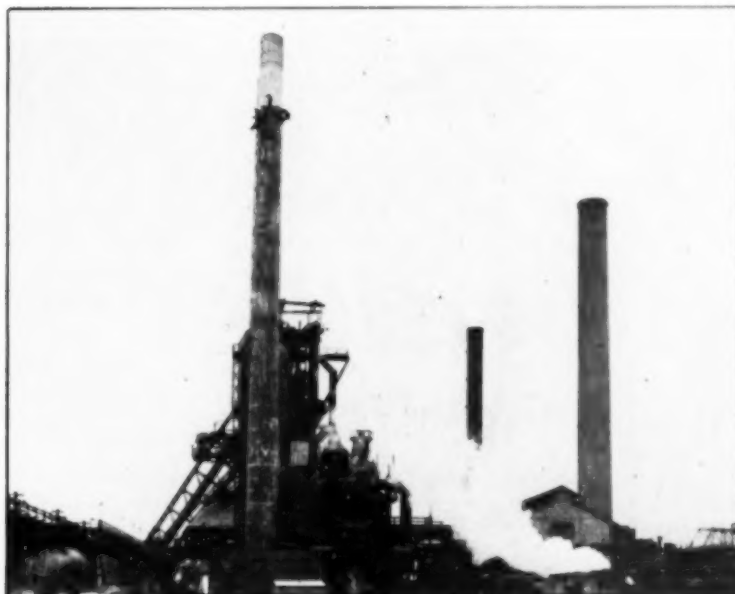
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facts and trends (continued from page 4)

- **COLLAPSIBLE CONTAINERS** of 500 and 2500 gallons capacity are handling bulk shipments of granular and powdery materials. The U. S. Rubber synthetic rubber and fabric containers offer a three-way saving--reduce handling and packaging costs at point of origin, permit low-cost bulk shipment, and simplify receiving and handling by the user.

Applications include the bulk shipment of chemicals, carbon black, starch, clay, flour, sugar, malt, and other corrosive and hygroscopic materials. The 2500 gallon container is 8 ft in diameter and 8 ft high. Collapsed for storage or return shipment, it is 8 ft long, 8 ft wide and 2 ft high.

- **MAINTENANCE EXPENDITURES** will reach \$22 billion annually by 1964--double what they are now, according to several industry surveys. Today's stepped-up production combined with increased labor, materials and equipment costs and the trend towards automation in industry, dictate a scheduled maintenance program.

To help industrial plants get the most productivity from existing facilities, Productive Maintenance Forums are now being sponsored by General Electric's Apparatus Sales Division. Forum covers five basic steps--gather complete data, evaluate routine maintenance so that the cost of equipment will show how much care is warranted, establish routine control system, evaluate critical maintenance needed, and establish a critical maintenance program.

- **USING A NEW ALUMINUM SHEATHING PROCESS**, General Cable Corporation will soon produce the country's first **DIRECT-EXTRUDED ALUMINUM SHEATHED CABLE**. Using an imported European press, aluminum will be extruded directly on an insulated cable core. Advantages over cables sheathed with lead or by other aluminum sheathing methods are reduced cost per unit volume, much lighter weight and greater mechanical strength.

- **WATER-COOLED EQUIPMENT** operators can reduce plant water consumption substantially with Van Vooren Products' Water-Mizer, a solenoid operated water valve with thermostatic shut-off that regulates the water supply to cooled equipment on the basis of actual need. Valve supplies full water flow as equipment is started; flow continues after equipment shuts down until thermostat in return line senses a safe temperature.

- **ATOMIC RESEARCH REACTORS**, adapted for use in training badly needed personnel for the nuclear power industry, as well as for conducting basic nuclear research and development, have been placed on the market by the Atomic Energy Division of The Babcock & Wilcox Company.

The two relatively low-cost units, modified versions of the declassified "water boiler" and "swimming pool" reactors developed at Los Alamos, Oak Ridge and other A.E.C. installations, will sell somewhere in the range of \$100,000 to \$150,000. Government approval is required before any institution can go ahead with a program of construction for either research or radioisotope production.

- **PAINT ROLLERS** are being advantageously used by Gates Engineering Company in Wilmington, Delaware, to apply chemical resistant finishes to metal equipment--industrial ventilators, heavy machinery and other metal surfaces exposed to corrosion. Rollers are made with a plastic core, to which is permanently bonded a Dynel cover fabric. Paint rollers cut application time in half (over other methods) and give a better coating.

Write the editors for additional information on any of the above items.
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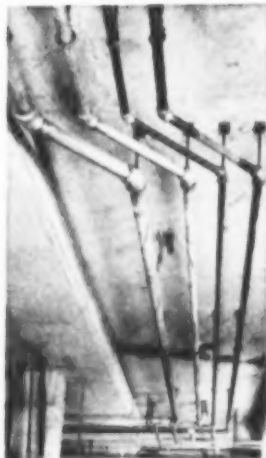
Wrought iron lasts longer, at lower cost per year because of its unique structure which resists corrosion and fatigue. Tiny fibers of glass-like iron silicate, distributed through the body of high-purity iron, halt and detour corrosive attack, discourage pitting and rapid penetration. These fibers also anchor the initial protective scale, which shields the underlying metal.

Our booklet, *The ABC's of Wrought Iron*, tells the story of this protection, and how it is bringing piping economy to a variety of applications where corrosion is a threat. Write for your copy.

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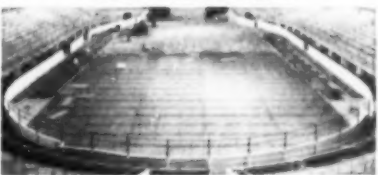
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NEWS *for the South and Southwest*



Electrical Conference of Petroleum Industry Tulsa, Oklahoma—September 27, 28 and 29th

A THREE day "Electrical Conference of the Petroleum Industry" will open at the Mayo Hotel in TULSA, OKLAHOMA, on Monday, September 27, under sponsorship of the Petroleum Industry Committee of the AIEE with the Tulsa section of the Institute acting as host.

A. C. MONTEITH, newly elected president of the AIEE and vice president in charge of engineering for Westinghouse Electric Corp., E. Pittsburgh, Pa., will be the main guest speaker at a buffet banquet on Tuesday, September 28th.

Diversified Program

On Monday, September 27, program papers and discussions feature maintenance personnel training; power systems for oil refineries; lightning protection in refineries and chemical plants; illustrations of typical explosion-proof installations; and a discussion of the background, intent, and application of the rules contained in Article 500 of the National Electrical Code.

Discussions on Tuesday, September 28, include design of automatic

pump stations, pressure control, single motor; application of large a-c motors and controls to refineries and pipelines; uses of radioactive substances in the petroleum industry; and maintenance control and procedures for electrified pipeline pumping stations.

Six papers dealing with the production of oil and gas are scheduled for Wednesday, September 29, supplemented by several afternoon plant inspection trips.

MAYOR L. C. CLARK, of Tulsa, will welcome the visitors from all sections of the country at the opening general session on Monday morning, Sept. 27th at 10 o'clock. The keynote address will be delivered by MAJOR A. N. HORNE of Texas-Empire Pipe Line Co., Tulsa. Ma-

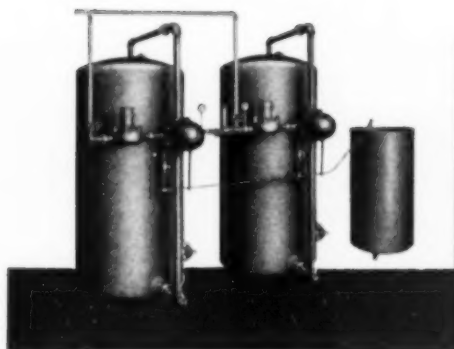


ELECTRICAL CONFERENCE PLANNERS—(seated) W. W. Hildebrand, Tulsa, chairman finance & budget; J. H. Heller, Tulsa section AIEE chairman; G. R. VanBurkleo, Tulsa chairman inspection trips & transportation; W. H. Stueve, Oklahoma City, chairman executive committee of conference; and R. S. Gardner, Asst Sec'y AIEE Headquarters, New York.

(Standing) R. D. Bennett, Tulsa, chairman printing & programming; Prof. D. L. Johnson, Stillwater, Okla., chairman student participation; J. C. Wells, Tulsa, member-at-large; R. J. Thompson, Oklahoma City, member-at-large; V. J. Sittel, Tulsa, vice chairman Petroleum Industry Committee; M. C. Callahan, Tulsa, chairman registration & hotel arrangements; H. M. Furtney, Tulsa, chairman regional publicity; Dale H. Watt, Tulsa, conference treasurer.

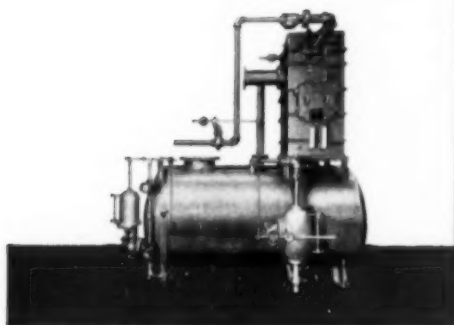
Other members not present for photo include: R. F. Danner, Oklahoma City, member-at-large; S. W. Sharp, Shreveport, La., AIEE national vice president for Industry Committee of AIEE; and R. E. Thornton, Oklahoma City, chairman Oklahoma City Section of AIEE.

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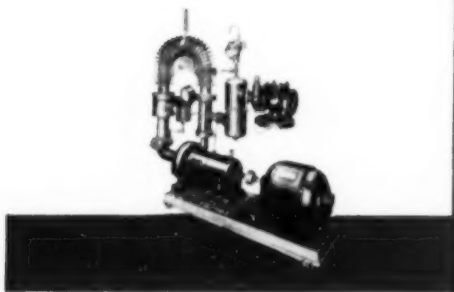
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News for the South and Southwest (continued)

for Horne is expected to review the work done in organization of this committee and outline the purposes and aims to be accomplished for betterment of electrical engineers associated in the petroleum industry and possible movement toward standardization of equipment.

GOV. JOHNSTON MURRAY of Oklahoma, an honorary member of Oklahoma Society of Professional Engineers, will be the honored guest speaker at noon Monday, Sept. 27th at a joint luncheon of the Conference with the Engineers Club of Tulsa in the main dining room at the new Tulsa Chamber of Commerce Building.

Technical Program Highlights

MONDAY, SEPTEMBER 27

- "Training of Maintenance Personnel" by A. J. Cloas, Socony-Vacuum Oil Co., E. St. Louis, Illinois.
- "Some Features of Power Systems for Oil Refineries" by H. J. Stewart, Humble Oil & Refining Co., Baytown, Texas.
- "Problems of Power Suppliers in Relation to Sales to Oil Industry Applications, Competition, and Facility Agreements, Contracts" by Thos. E. Graham, Oklahoma Gas & Electric Co., Oklahoma City, Oklahoma.
- "Lightning Protection in Petroleum Refineries & Chemical Plants" by James V. Cundelan & Ernest C. Benjamin, M. W. Kellogg Co., New York, N. Y.
- "The Background, Intent & Application of the Rules Contained in Article 500 of the National Electric Code" by C. M. Park, M.I. Mutual Fire Prevention Bureau, Chicago, Illinois.
- "Illustrated Lecture on Typical Explosion-Proof Installations" by R. B. West, Blow-Knox Co., Chemical Plants Division, Tulsa, Oklahoma.

TUESDAY, SEPTEMBER 28

- "Design of Automatic Pump Stations, Pressure Control, Single Motor" by Paul Plovansky, Service Pipe Line Co., Tulsa, Oklahoma.
- "Application of Large AC Motors to Refineries & Pipelines" by G. L. Ovarson, Electric Machinery Mfg. Co., Minneapolis, Minnesota.
- "Relation between Speed-Torque of Motors at Various Starting Inrush Currents & Speed-Torque Relations for Closed & Open Head Gate Valves" by Benton Bejack, General Electric Co., Dallas, Texas.
- "Uses of Radioactive Substances in the Petroleum Industry" by Wm. Jarzembki, Jarco Services Inc., Tulsa, Oklahoma.
- "The Use of Oil Circuit Breakers for Pipeline Pump Stations" by H. A. Norberg, Nelson Electric Mfg. Co., Tulsa, Oklahoma.
- "Terminal Circuitry for Remote & Automatic Control of Pipeline Pumping Stations" by M. A. Hyde & W. A. Derr, Westinghouse Electric Corp., E. Pittsburgh, Pa.
- "Maintenance Control & Procedure for Electrified Pipeline Pumping Stations" by R. M. Culver, Jr., Plantation Pipe Line Co., Baton Rouge, Louisiana.

WEDNESDAY, SEPTEMBER 29

- "Use of Electric Heating in Relation to Paraffin Problems" by Gratton A. Smith, Shell Oil Co., Tulsa, Oklahoma.
- "Use of & Late Developments of Reda Submerged Pump Units" by Joe Carle, Reda Pump Co., Bartlesville, Oklahoma.
- "Use of Electrodiesel for Oil Well Drilling & for Core Taking" by Tom Sutton, Reda Pump Co., Bartlesville, Oklahoma.

"Economic Aspects of Using Electric Power for Water Flooding in Secondary Recovery of Oil Producing Fields" by J. R. Hotfield & Frank Beach, Cities Service Oil Co., Bartlesville, Oklahoma.

"Electric Equipment Maintenance Costs, Motor Control for Indoor & Outdoor Applications" by Tom L. Scott, Phillips Petroleum Co., Bartlesville, Oklahoma.

"Design of Distribution Systems for Lease Electrification" by B. L. Moore, Humble Oil & Refining Co., Houston, Texas.

For complete program, advance registration and hotel reservation return card, write:

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Gulf Refining Co.
Box 661
Tulsa 2, Oklahoma

Warden Brooks Heads Ingalls' Atlanta Office

The appointment of WARDEN A. BROOKS as district sales engineer of THE INGALLS IRON WORKS COMPANY, Birmingham, Ala., in its newly established Atlanta office has been announced by K. H. Gayle, Jr., president.



Warden Brooks

Mr. Brooks, a native of Atlanta, Ga., and a former structural engineer with Robert and Company, architects and engineers of Atlanta, opened Ingalls' branch sales office in the First National Bank building July 1st. He will also represent The Ingalls Steel Construction Company, a subsidiary, and the Birmingham Tank Company division.

Prior to his Robert and Company association Mr. Brooks was a structural engineer with the Georgia Power Company, Atlanta, and the Newport News Shipbuilding and Dry Dock Company, Newport News, Va. He graduated from Georgia Tech in 1922.

Trane Co.—N. C., Tenn.

THE TRANE COMPANY, manufacturing engineers of air conditioning, heating, ventilating and heat transfer equipment, announces the change of address of two Southern sales offices.

The CHARLOTTE, N. C., sub-office of the Greensboro sales office is now located in the Smith Building at 116½ S. Church St. LOY F. THOMPSON is sales engineer in charge of the office.

The NASHVILLE, TENN., sub-office of the Louisville sales office is now located at 1810 Broad Street. Sales engineer in charge of this office is FRED DAVIDSON, JR.

FUTURE EVENTS

Of Engineering Interest

INSTRUMENT SOCIETY OF AMERICA

Mg. Dir., First International Instrument Congress & Exposition, 845 Ridge Ave., Pittsburgh 12, Pa.
Sept. 15-21, First International Instrument Exposition, Philadelphia Convention Hall, Philadelphia, Pa.

PUBLIC UTILITIES ASSOCIATION OF THE VIRGINIAS

Robert W. McKinnon, Exec. Sec'y, 5 Franklin Road, Roanoke, Va.
Sept. 16-18, Thirty-sixth Annual Meeting, The Greenbrier, White Sulphur Springs, W. Va.

NATURAL GASOLINE ASSOCIATION OF AMERICA

William F. Lowe, Sec'y, 422 Kennedy Bldg., Tulsa 3, Okla.
Sept. 17, Oklahoma Regional Meeting, Skirvin Hotel, Oklahoma City, Okla.
Oct. 29, Southern Regional Meeting, Blackstone Hotel, Tyler, Texas.
Dec. 3, Panhandle-Plains Regional Meeting, Herring Hotel, Amarillo, Texas.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

Harold M. Furtney, Chm. Tulsa Section, 1610 E. 32nd Place, Tulsa 5, Okla.
Sept. 27-29, Electrical Conference for the Petroleum Industry, Mayo Hotel, Tulsa, Okla.

PETROLEUM ELECTRIC POWER ASSOCIATION

W. L. Pearson, Sec'y, P. O. Box 1261, Amarillo, Texas.
Oct. 4-6, Twenty-sixth Anniversary Meeting, Jung Hotel, New Orleans, La.

SOUTHERN TEXTILE EXPOSITION

Miss Bertha Green, Sec'y, Textile Hall Corp., Greenville, S. C.
Oct. 1-8, Eighteenth Southern Textile Exposition, Textile Hall, Greenville, S. C.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

H. H. Henline, Sec'y, 33 West 29th St., New York 18, N. Y.
Oct. 11-13, Fall General Meeting, Morrison Hotel, Chicago, Ill.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

C. E. Davies, Sec'y, 29 West 29th St., New York, N. Y.
Oct. 28-29, ASME-AIME Joint Fuels Conference, William Penn Hotel, Pittsburgh, Pa.
Nov. 28-Dec. 3, Annual Meeting, Statler Hotel, New York, N. Y.

AMERICAN SOCIETY FOR METALS

W. H. Eosman, Sec'y, 7361 Euclid Ave., Cleveland 3, Ohio.
Nov. 1-5, National Metal Congress and Exposition, International Amphitheater, Chicago, Ill.

AUTOMATIC CONTROL EQUIPMENT SHOW

Strauss, Spigler & Kline, Mgr., Philadelphia, Pa.
Nov. 21-23, First Automation Show, Waldorf-Astoria Hotel, New York, N. Y.

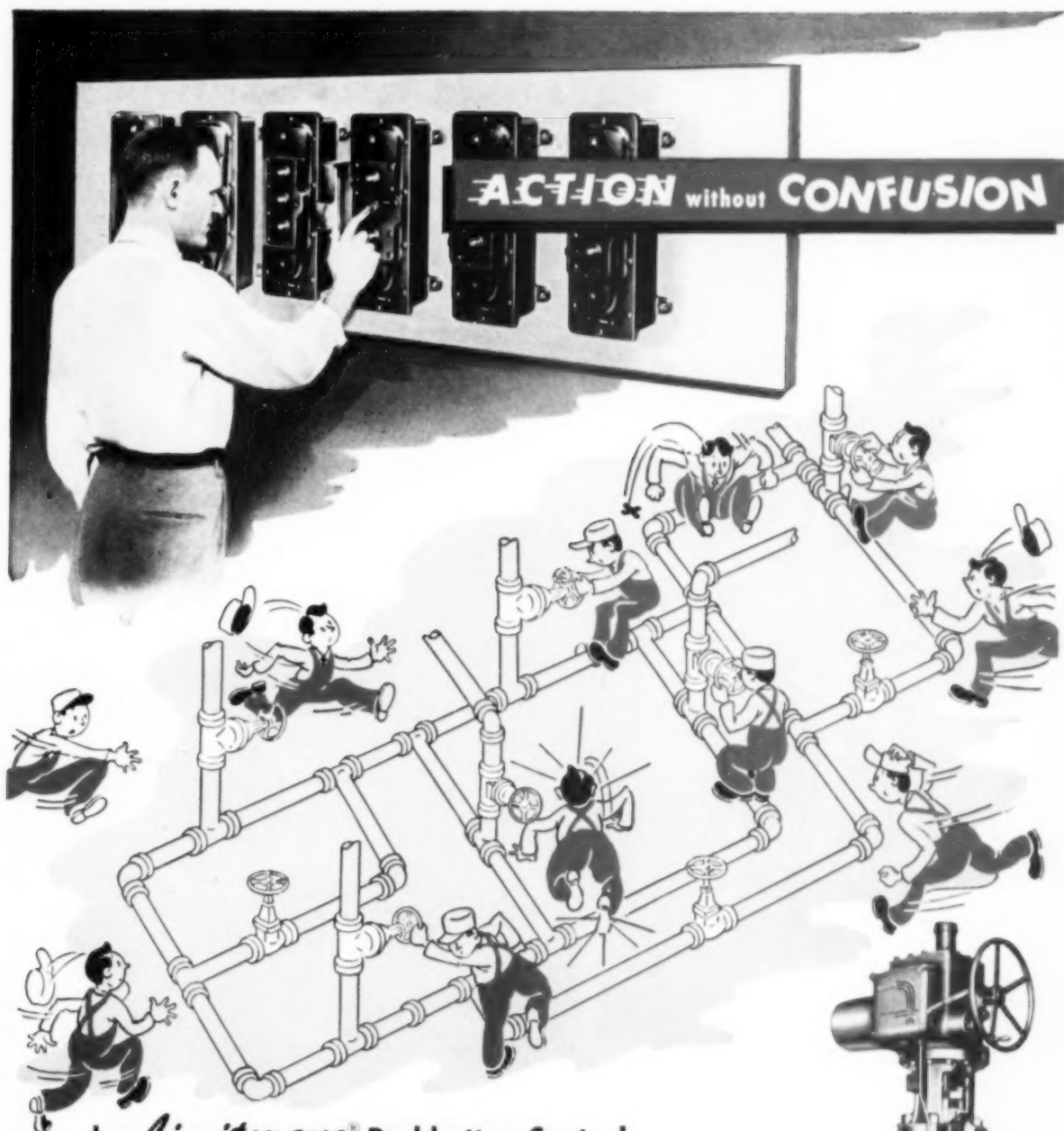
21ST NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING

E. K. Stevens, Mgr., International Exposition Co., 489 Lexington Ave., New York 17, N. Y.
Dec. 2-7, Power Show, Commercial Museum, Philadelphia, Pa.

SOUTHERN SAFETY CONFERENCE, INC.

W. L. Groth, Exec. Dir., P. O. Box 8927, Richmond 23, Va.
Feb. 27-Mar. 1, 1955, Sixteenth Annual Conference and Exposition, Jung Hotel, New Orleans, La.

(More News—page 102)



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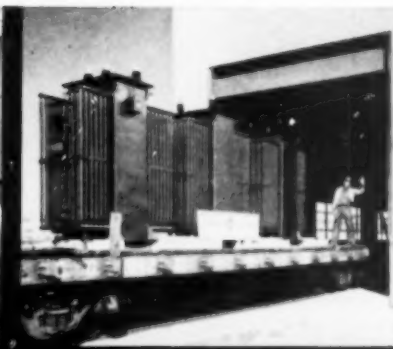
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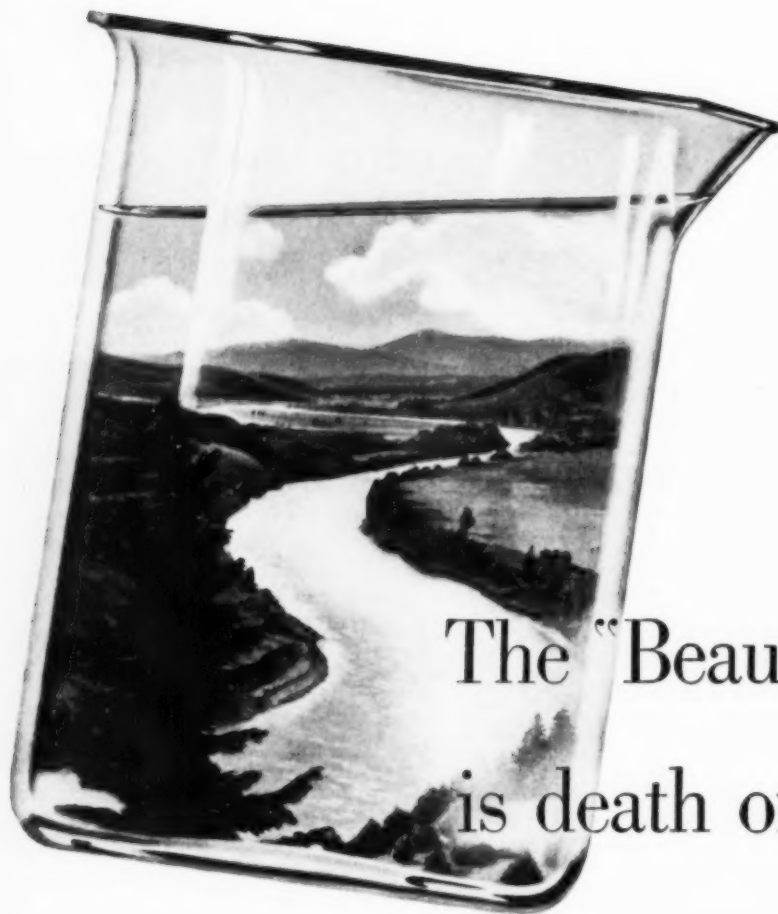
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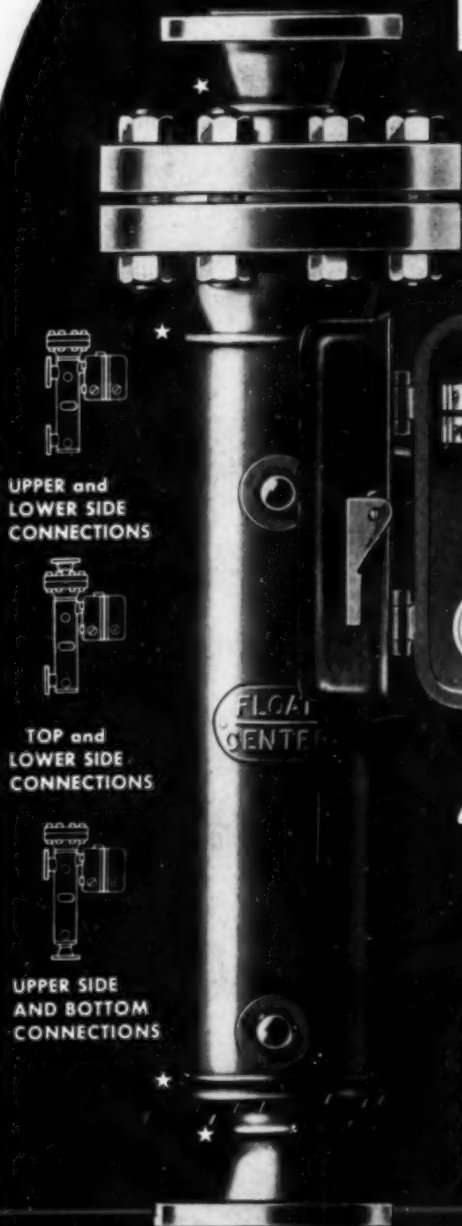
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403	410	434	439	446	454	463	472	479	482	495	527	559	579	582	631	633
636	687	693	728	746	752	758	754	814	821	823	864	866	868	907	956	979
984	U-1	U-2	U-3	U-4	U-5	U-6	U-7	U-8	U-9	U-10	U-11	U-12	U-13	U-14	U-15	U-16
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ELECTRICAL

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9-54-2

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U-17	U-18	U-19														

Also send further information on following New Equipment (page 94)

J-1	J-2	J-3	J-4	J-5	J-6	J-7	J-8	J-9	J-10	J-11	J-12	J-13	J-14	J-15
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Name Position

Company Name

Street

City Zone State

Continued on page 116

List Items You Want,
Tear Out and Mail
One of the
Attached Cards
Now!

Please be sure to fill in your Firm's Name and your position on the Coupon. This service cannot be extended to you unless this information is furnished.

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Will be Paid
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Equipment and Review Editor
SOUTHERN POWER AND INDUSTRY
806 Peachtree St., N. E.
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*Why your
Ljungstroms
are so efficient
—year
after year*



Air Preheater Corporation Field Engineers aim to visit every Ljungstrom Air Preheater in this country at least once a year. Their main objective is to increase availability and assure you a maximum return on your investment. They are always available for consultation.

This is just another reason why the Ljungstrom Air Preheater is the most economical heating surface on the modern boiler.

THE AIR PREHEATER CORPORATION

60 East 42nd Street
New York 17, N. Y.



**"Yes, I agree...
we should stick to coal,"
said the President.**



PLANT ENGINEER: "On the basis of delivered BTU's any other fuel would cost us considerably more than coal."



PURCHASING AGENT: "Coal is the one fuel you can store in large quantities safely and economically. It always gives me a comfortable feeling to know there is at least a month's supply here in the bins."



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SALES MANAGER: "One of our talking points is the uniform finish which comes from an even oven temperature. I hate to think what might happen if we changed to an on-again-off-again heat."



PRESIDENT: "There being no dissenting vote, we will stick to coal."

**Bring your fuel problems
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As the world's largest carrier of bituminous coal, the C&O is intimately familiar with every phase of coal use. We have a large staff of experts who will gladly help you to locate the coal best suited to your needs; to help you use it most efficiently; to help get it to you promptly.

Write to:
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Chesapeake and Ohio Railway

World's Largest Carrier of Bituminous Coal

TRANSFORMER Treasure Hunt

**General Electric offers
a new transformer
for oldest G-E unit
in ASA range**

To promote the benefits of standardized transformers and to commemorate the dedication of its new Repetitive Manufacture transformer plant, General Electric plans a unique monument. The Company is sponsoring a "treasure hunt" to find the oldest G-E (or Stanley Electric) transformer in the RM range of ratings that was still in operation on May 11, 1954, the day the plant was dedicated. The prize, in exchange for the oldest unit, will be a new G-E self-cooled, oil-insulated transformer of equivalent rating delivered free of charge.

BONUS PRIZE FOR REPLACEMENT BY RM UNIT

If the winning transformer can be replaced with an RM unit having kva and voltage ratings and impedance values which are listed in the ASA standard, there will be an extra bonus in the form of an all-expenses paid trip to G.E.'s new Rome, Ga., plant for a man in the winner's organization.

WHAT TRANSFORMER WILL QUALIFY?

The transformer G.E. is looking for has to be in the ASA range of ratings—501 to 5000 kva single-phase, 501 to 10,000 kva three-phase 69,000 volts and below, 60 cycles.

It must have been in continual service as of May 11, 1954—except for normal periods of maintenance, spare duty or relocation.

WHO CAN PARTICIPATE?

All electric utilities, manufacturing, and transportation companies are invited to take part in this nationwide transformer "treasure hunt."

HOW TO ENTER THE "TREASURE HUNT"

It's easy to enter the treasure hunt. It's fun. And it may be profitable. But, do it right away. Your entry must be post-marked not later than November 1, 1954. If you have a transformer "old timer" still in operation, why not ask your G-E Apparatus Sales Representative for a "treasure hunt" entry blank. Or write for Entry Form GEZ-1046. General Electric Company, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL  ELECTRIC

Ultra-Modern Design



Administration and Research Center
S. C. Johnson & Son, Inc., Racine, Wis.
Architect: Frank Lloyd Wright
Consulting Mechanical Engineers:
Samuel R. Lewis & Associates



Says: Adrian Wilson, Power Plant Assistant Manager
S. C. Johnson & Son, Inc.,
Racine, Wisconsin

"Our plant uses an average of 900 tons of coal per month. At the conclusion of a recent analysis of relative fuel costs, we were unable to justify a change from coal to any other fuel. In burning coal the modern way, we have steadily improved the efficiency of our power plant."

If you plan to modernize—or to build a new plant, be sure to investigate the convenience and money-saving advantages of coal when burned with modern equipment.

You can enjoy automatic operation and save on labor by installing up-to-date coal-feeding and ash-handling systems. And you can eliminate dust or smoke nuisances with such devices as dust collectors and cinder rejectors. Often such equipment can pay for itself in fuel and labor savings in only a few short years.

Get the advice of a consulting engineer. He can make a fuel analysis for you. He can advise you on what equipment can best fill your specific needs and return you a big saving year after year with coal.

...fired by coal

In the famous plant of Johnson's Wax, modern equipment makes coal a clean and automatic fuel . . . and saves dollars year after year.

YOUR BEST BUY IS BITUMINOUS

- ✓ Today's lowest-cost fuel, in most places, is Bituminous Coal!
- ✓ The most stable fuel in price is coal, because coal reserves are virtually inexhaustible . . . coal mining is highly mechanized.
- ✓ The safest fuel to store and use is coal.
- ✓ Your best bet for saving dollars is coal . . . for modern equipment greatly multiplies coal's inherent advantages.

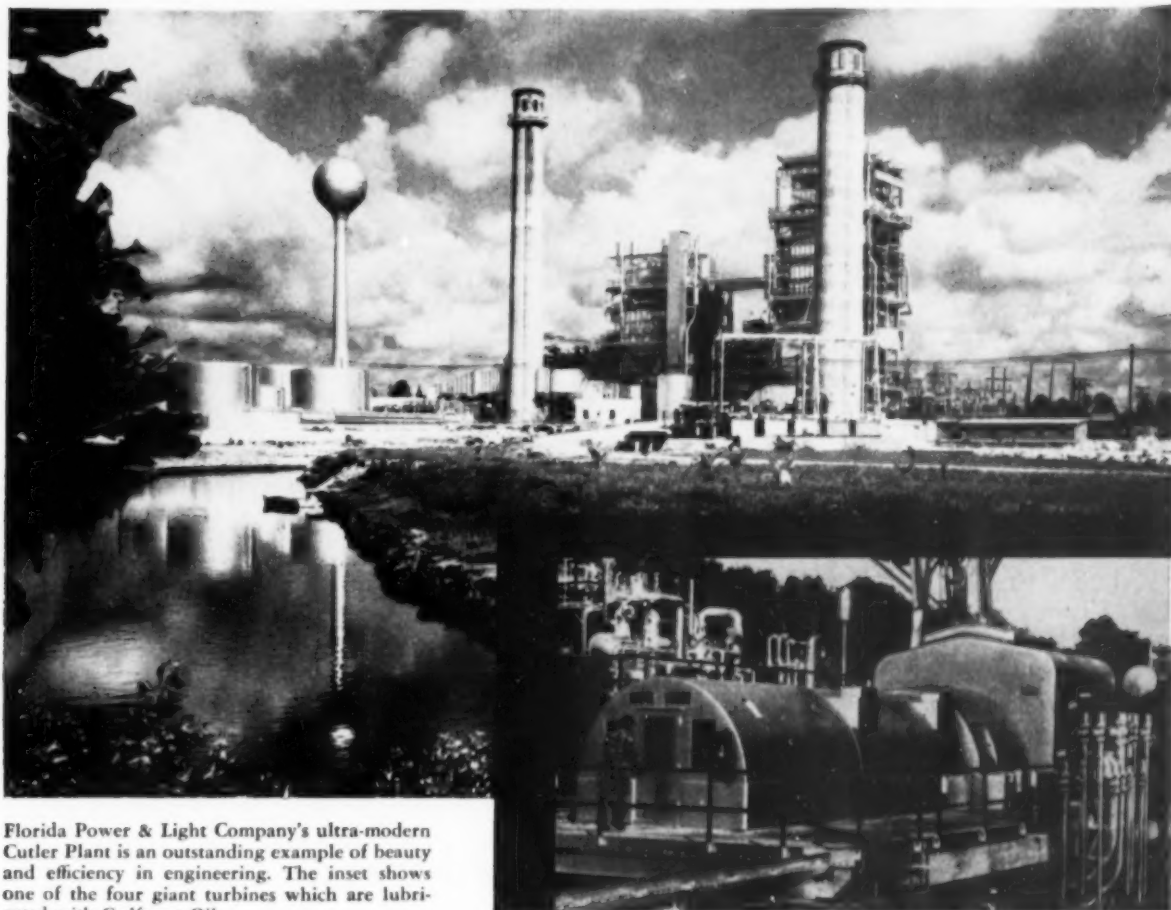
Additional case histories, showing how other types of plants have modernized and saved money by burning coal with modern equipment, are available upon request.

BITUMINOUS COAL INSTITUTE

A Department of National Coal Association
Southern Building, Washington 5, D. C.

FOR HIGH EFFICIENCY  FOR LOW COST
YOU CAN COUNT ON COAL!

Gulfcresc Oil selected for Florida's newest and largest power plant



Florida Power & Light Company's ultra-modern Cutler Plant is an outstanding example of beauty and efficiency in engineering. The inset shows one of the four giant turbines which are lubricated with Gulfcresc Oil.

Setting the pace for Florida's phenomenal economic growth is the Florida Power & Light Company which serves 452 thousand customers in the Sunshine State. Included in its current \$332 million expansion program is the giant new Cutler Plant—largest in the state.

The four huge generators (whose capacities total 160,000 kilowatts) and auxiliary equipment in the Cutler Plant are lubricated with Gulfcresc—the world's finest turbine oil.

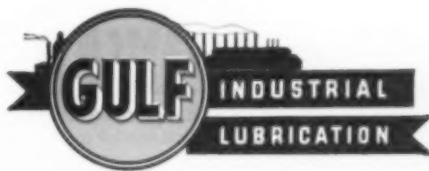
Gulfcresc Oil was not chosen at random for this important job. It has a background of superior performance in other Florida Power & Light Company plants, as well as in scores of other prominent utilities in Gulf's marketing territory.

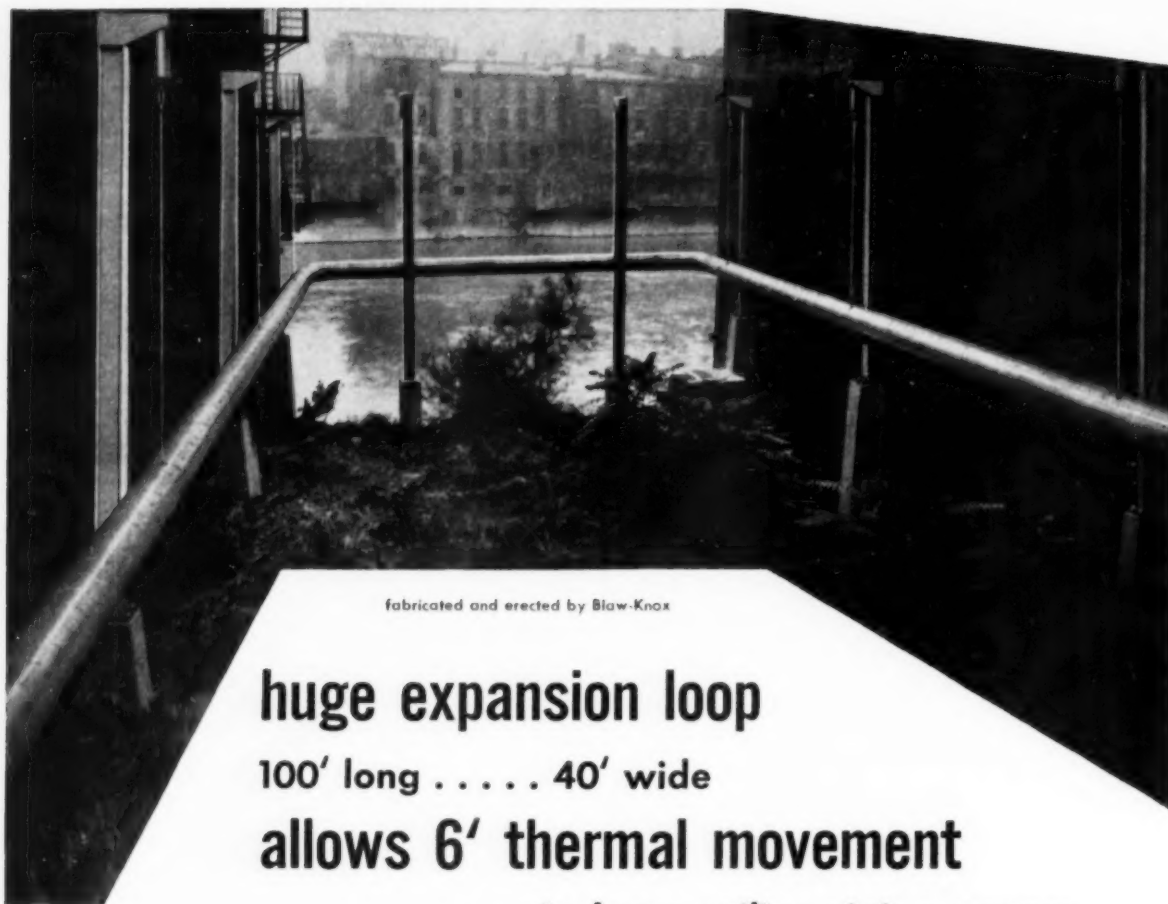
In many installations Gulfcresc has been in service over 15 years without any significant

change in its original characteristics, and with neutralization numbers always remarkably low.

You'll be joining an impressive group of satisfied users when you fill your turbine system with this outstanding oil.

Your nearest Gulf office has a Gulf Sales Engineer always available to recommend the proper grade of Gulfcresc Oil for your turbine. Call him today, or write to the Gulf Oil Corporation, 1822 Gulf Building, Pittsburgh 30, Pa.





fabricated and erected by Blaw-Knox

huge expansion loop 100' long 40' wide allows 6' thermal movement . . . in large utility piping system

This tremendous expansion loop is only one part of a ten-inch power piping line which carries steam at 650# pressure and 750° Fahrenheit for nearly a mile throughout the downtown area of a large city. All bends were fabricated in our shops . . . and installed in the field by our service force, using Blaw-Knox functional hangers and vibration eliminators.

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On a job you place with us, you'll have the benefits of modern shop facilities for hot and cold bending, welding and fabricating all types of piping. A metallurgical research laboratory to assure you of the latest developments in high pressure, high temperature piping. Newest types of testing equipment to insure the soundness and

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And in addition, a complete service force equipped with modern machinery for field erection . . . and the necessary manpower to handle any size job.

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Our engineers will quote from your drawings . . . or, where desired, make a field study of your piping requirements before quoting.

Write us your requirements . . . and we'll provide the service you need.

BLAW-KNOX COMPANY

*Power Piping and Sprinkler Division
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To get more information on piping for industry write for your copy of Bulletin No. 2443.



POWER PIPING

Complete prefabricated power piping systems for all pressures and temperatures . . . plus complete line of functional spring hangers • rigid hanger assemblies • overhead roller assemblies • supports • vibration eliminators

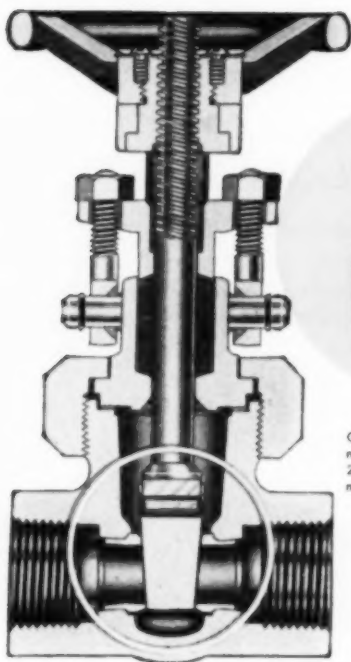


FIG. 1221
OS & Y, union bonnet. Sizes: 1/4" to 2". 600 pound primary pressure series.

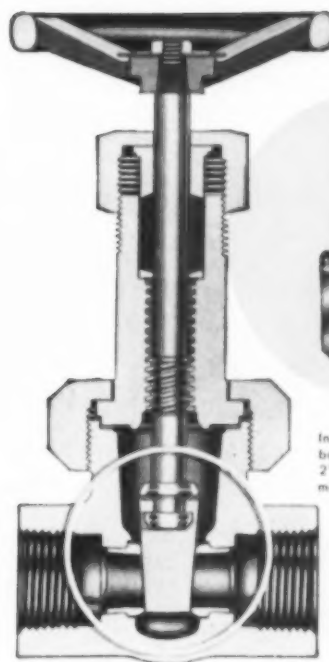


FIG. 1021
Inside screw union bonnet. Sizes: 1/4" to 2". 600 pound primary pressure series.

New design makes OIC forged steel gate valves the most modern line . . .

NEW: stronger stem-to-wedge connection. Improved, modern design increases pull-out strength to many times the theoretical requirement. This design distributes the pull-out load more efficiently throughout the wedge structure to meet the most stringent specifications of valve buyers in all fields.

NEW: wedges wear longer. Wedges are made of 13% chrome stainless steel for corrosion resistance. They are duracased to at least 1000 Brinell Hardness to prevent galling and excessive wear caused by frequent closures upon foreign particles in the flow.

NEW: union bonnet design is more efficient. Body-to-bonnet joint of the male-female type provides a recess for the gasket. It is contained more securely, reducing the possibility of leakage or a blown gasket.

OTHER OUTSTANDING FEATURES

Stem threads of all OIC inside screw, forged steel valves are always contained inside the bonnet. They can't pos-

sibly load up with corrosive matter which might be in the flow. This keeps the threads clean and free running, and contributes to longer stem wear.

Modern OIC Seal-Ever packing is a special composition which eliminates electrolytic action between the stem and the packing. This prevents stem corrosion in the packing area and helps maintain a leakproof seal.

Back-seating feature provides means of repacking valves while in service.

OS & Y valve gland "I" bolts are retained on trunnions by modern, more efficient, stainless steel snap rings.

Shoulder-type seat rings are expanded into the body under heavy pressure. They are accurately machined to mate tightly with the wedge for a positive seal.

Order modern OIC Forged Steel Valves from your nearby OIC Distributor. Write and request Folder No. 195.

OIC Forged Steel Valves are also available in globes, angles and checks in a variety of trims for any service.

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**FORGED & CAST STEEL, LUBRICATED PLUG,
BRONZE & IRON**



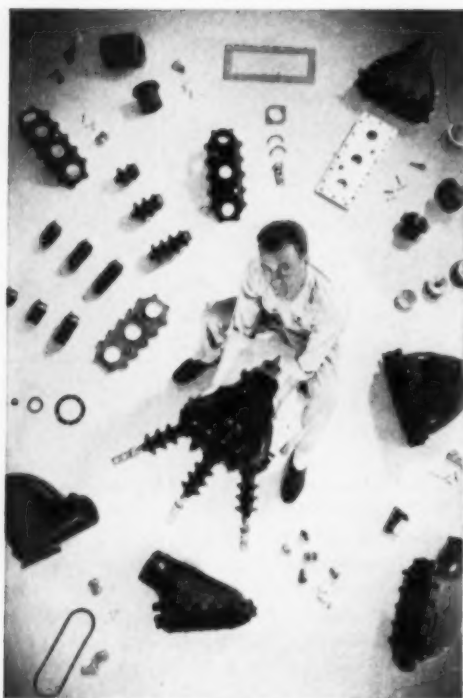
"Here's why I buy my **CABLE ACCESSORIES** where I buy my cable—at **ANACONDA!**

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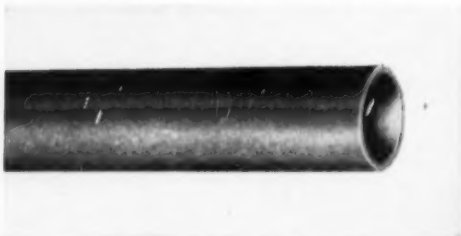
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Parts are *fully interchangeable* for greater adaptability, faster delivery, easier installation and lower costs. Anaconda supplies both gasket and solder-sealed types . . . your stock problem is simplified, too!

F-3* LEAD-ALLOY JOINT SLEEVE



F-3 has higher tensile strength, lower creep rate, greater bursting strength, and higher resistance to bending fatigue and vibration. Specify F-3 Lead Sleeve and be sure. *Reg. U. S. Pat. Off. 24347

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Your cable-installation crews have everything they need for a specific joint. All the materials you need are always on the spot—never forgotten . . . never left behind—assures neat, lasting job.

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The sun never sets on power plants having the added operating refinements of A-S-H systems and equipment. Helping to get rid of ash and dust with greater efficiency and economy is our contribution to modern power generation—over 2,000 major installations, predominately in America but extended throughout both hemispheres. Our vast experience is at your disposal.



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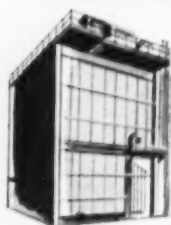
(pneumatic)

materials handling systems

In the 267 new  central station

units being started in 40 different states

during the 1953-56 period, 75% of the



boilers will be equipped with

Consolidated Maxiflow Safety Valves



...35% will also have

Consolidated

Electromatic Relief



Valves. These

bulletins



tell you why.

Consolidated Maxiflow Safety Valve BULLETIN 707 contains data about the greater discharge capacity, permanent tightness and easily controlled blowdown that make this valve outstanding in safety and service.

Consolidated Electromatic Relief Valve BULLETIN 720 tells how this valve assures (1) more accurately balanced boiler operation; (2) more uniform line pressure; (3) power conservation; (4) less maintenance of spring-loaded safety valves; (5) greater protection against overheating your superheater; (6) increased efficiency for your steam generating plant.

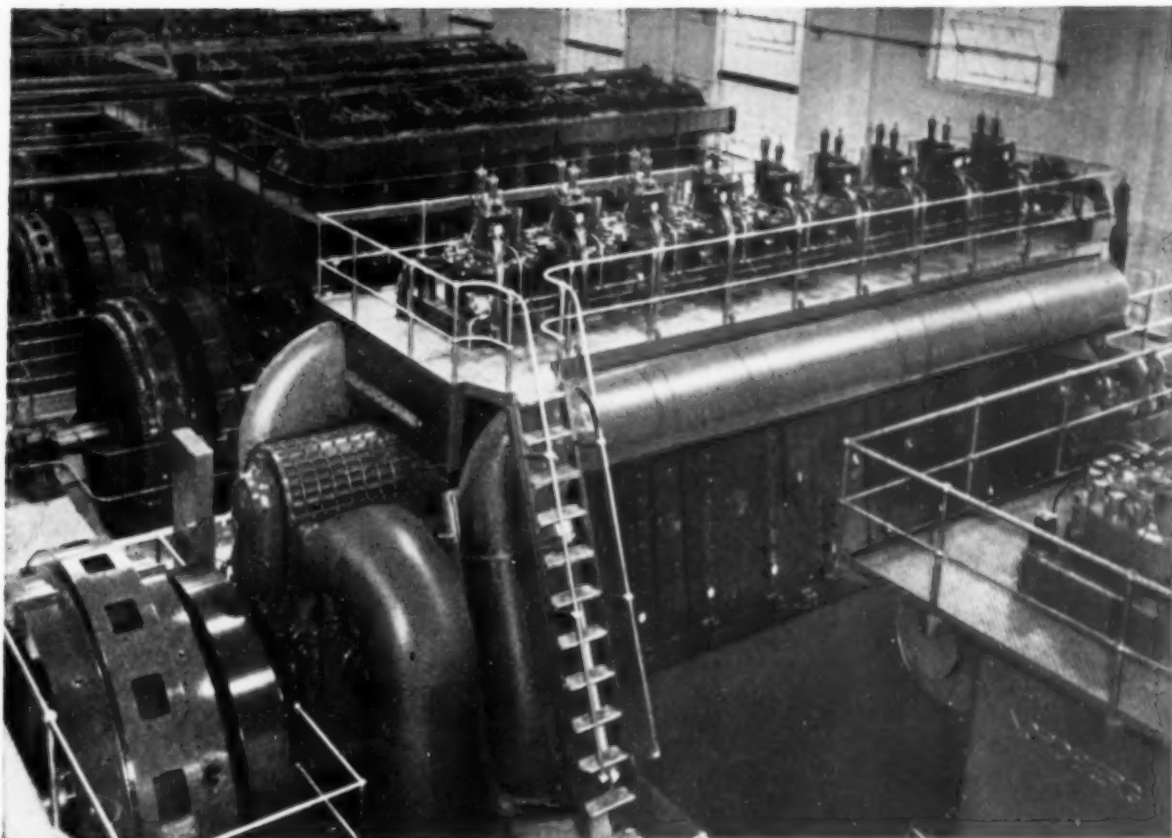
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CONSOLIDATED SAFETY VALVES



A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONN.

MAKERS OF 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN' AND 'AMERICAN-MICROSEN' INDUSTRIAL INSTRUMENTS, 'HANCOCK' VALVES, 'ASHCROFT' GAUGES, AIRCRAFT PRODUCTS. BUILDERS OF "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.



Largest Diesel Power Generating Station in the U.S.

reduces cylinder and piston ring wear with SHELL ROTELLA OIL

Electric power for the City of Grand Haven, Michigan, and the surrounding area, is generated by diesel engines in the largest municipal power station of its kind in the U. S. A. Shell Rotella Oil is the cylinder lubricant.

The anti-corrosive action in Shell Rotella Oil combats the major cause of engine wear . . . cylinder and piston ring wear caused by acid action from the by-products of

incomplete combustion and condensation.

Tougher lubricating film in Shell Rotella Oil gives cylinders and rings greater protection . . . minimizes wear. Its effective detergent-dispersant action prevents harmful deposits.

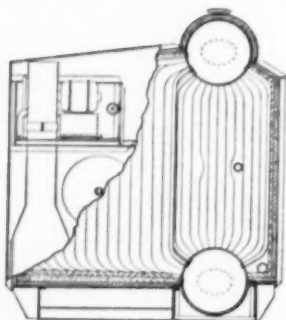
Write for technical information. See for yourself how Shell Rotella Oil can help reduce your engine maintenance costs.

SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA



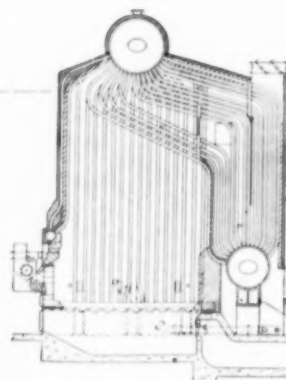
WHICH C-E BOILER MEETS YOUR STEAM NEEDS BEST?



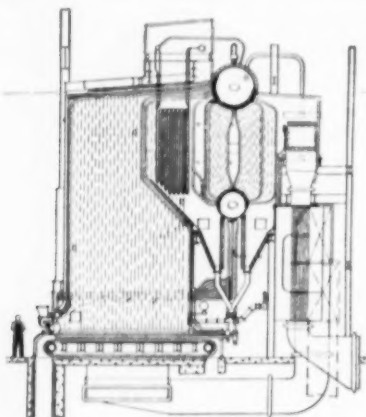
C-E Package Boiler—Type VP—The VP Boiler is designed to meet the demand for compact, standardized units in the medium pressure range. It is shipped completely shop-assembled, with firing equipment, fittings, and forced-draft fan. It is enclosed in a reinforced, welded steel, gas-tight casing. Arranged for pressure firing of oil or gas, the VP will burn either fuel exclusively or alternately. Designed for convenient rail shipment, its width and height remain constant . . . variations are made in length only. Furnace is fully water-cooled, including burner wall, except in three smallest sizes. Large lower drum permits simple, symmetrical tube arrangement and greater water storage capacity.

Type VP Boiler—from 4,000 to 40,000 lb steam per hr . . . pressure to 500 psi . . . available for either gas or oil firing . . . fully shop-assembled.

C-E Vertical-Unit Boiler—Type VU-10—Like the Type VP Package Boiler, the VU-10 is designed for plants having a limited number of operating and maintenance personnel. It is designed for industrial load conditions and will operate efficiently over a wide range of output. The boiler is bottom supported and has no outside supporting steel. The same general cross-section arrangement of drums, boiler convection bank, and furnace wall cooling is used when firing oil, gas or coal. Coal firing may be with underfeed, spreader, or chain grate stokers.



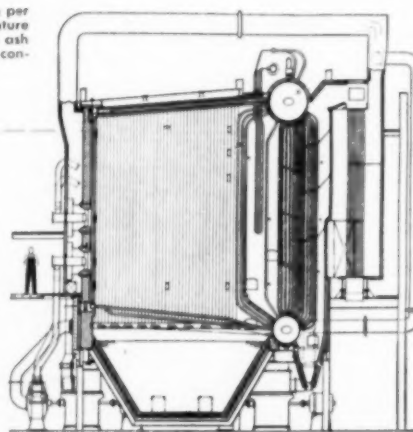
Type VU-10 Boiler—from 10,000 to 60,000 lb steam per hr . . . pressure to 475 psi . . . superheat to 200 F . . . suitable for any type of fuel.



C-E Vertical-Unit Boiler—Type VU-40—The VU-40 Boiler is a baffless boiler designed for use with fuels having abrasive qualities in the flue dust. In a baffled boiler using these abrasive fuels, erosion is apt to occur. In the VU-40 Type Boiler, the eroding action of abrasives against boiler tubes and refractory is virtually eliminated. Like the VU-10 and VU-50, this unit is of symmetrical design, providing uniform gas flow and heat absorption across the full width of the boiler.

Type VU-40 Boiler—from 60,000 lb steam per hr up . . . pressure to 1375 psi . . . temperature to 960 F . . . for use with abrasive or high ash content fuel . . . indoor or outdoor type construction.

C-E Vertical-Unit Boiler—Type VU-50—With the VU-50 Boiler, the average plant can achieve standards of performance closely approaching those of large central power stations. The basic design was originated by Combustion in 1925 and has been widely accepted among steam-power engineers everywhere. Because of its symmetrical design the VU-50 provides uniformity of gas flow, water level and steam release across the full width of the unit. It may be fired by pulverized coal as shown opposite or by any other fuel or method of firing. Heat recovery equipment may be added.



Type VU-50 Boiler—from 60,000 to 330,000 lb steam per hr . . . pressure to 1375 psi . . . temperature to 960 F . . . for any fuel or method of firing . . . indoor or outdoor type construction.

B-703A

COMBUSTION ENGINEERING, Inc.

Combustion Engineering Building, 200 Madison Avenue, New York 16, N. Y.



BOILERS, FUEL BURNING & RELATED EQUIPMENT; PULVERIZERS, AIR SEPARATORS & FLASH DRYING SYSTEMS; PRESSURE VESSELS; AUTOMATIC WATER HEATERS; SOIL PIPE

Just name the valve needed-- Powell can supply it!

You'll find just the valve you need in the complete line of Powell Valves. For Powell probably makes more kinds of valves—and has solved more valve problems—than any other organization in the world.

And Powell Valves have a record of dependable flow control since 1846.

Powell Valves are made $\frac{1}{8}$ " to 30" and 125 pounds to 2500 pounds W.S.P. Bronze, iron, steel and corrosion resistant alloys. Available through distributors in principal cities. On problems, write direct to The Wm. Powell Company, Cincinnati 22, Ohio.

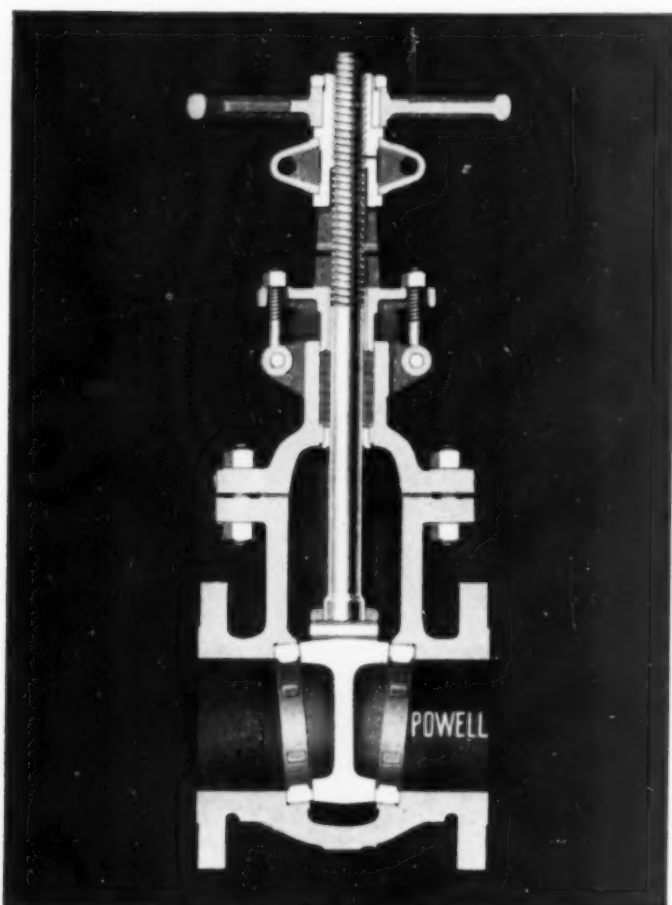


FIG. 1503 (sectional) —150-POUND CAST STEEL GATE VALVE. Flanged ends, bolted flanged bonnet with outside screw rising stem and yoke. Solid wedge. Available in sizes 1" to 24", inclusive.

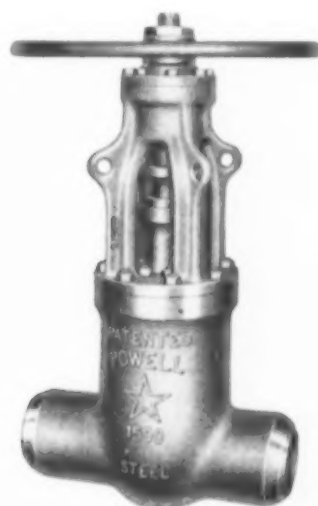


FIG. 11303—1500-POUND PRESSURE SEAL CAST STEEL GATE VALVE. Many proven advantages and exclusive features. Pressure Seal Valves are also available in Non-Return, Check, Globe and Angle Patterns for 600, 900, 1500, 2500 pounds.



FIG. 1331-A—1500-POUND INTEGRAL BONNET OFFSET GLOBE VALVE. One-piece construction eliminates possibility of leakage between body and bonnet. Sizes $\frac{1}{2}$ " to 2", inclusive.

CONTROLS FOR THE LIFE LINES OF INDUSTRY

Powell Valves

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**J. S. Coleman, President
Burroughs Corporation**

"Business Publications are essential tools of management"

"To keep abreast of rapidly developing techniques in all areas of business operations," says Mr. Coleman, "is not an easy task. Yet, if management is to discharge the responsibilities laid upon it, it must be informed both of technical developments and, indeed, of events and trends of the nation as a whole."

"Without business publications," Mr. Coleman adds, "the job would be impossible. As the size and complexity of the job have grown, management has come to depend increasingly on business publications for information necessary to sound judgment."

When editorial pages are read with eagerness, advertising pages in those same publications have equally high specialized value. They provide a direct sales route for any product or service of benefit to business or professional men.

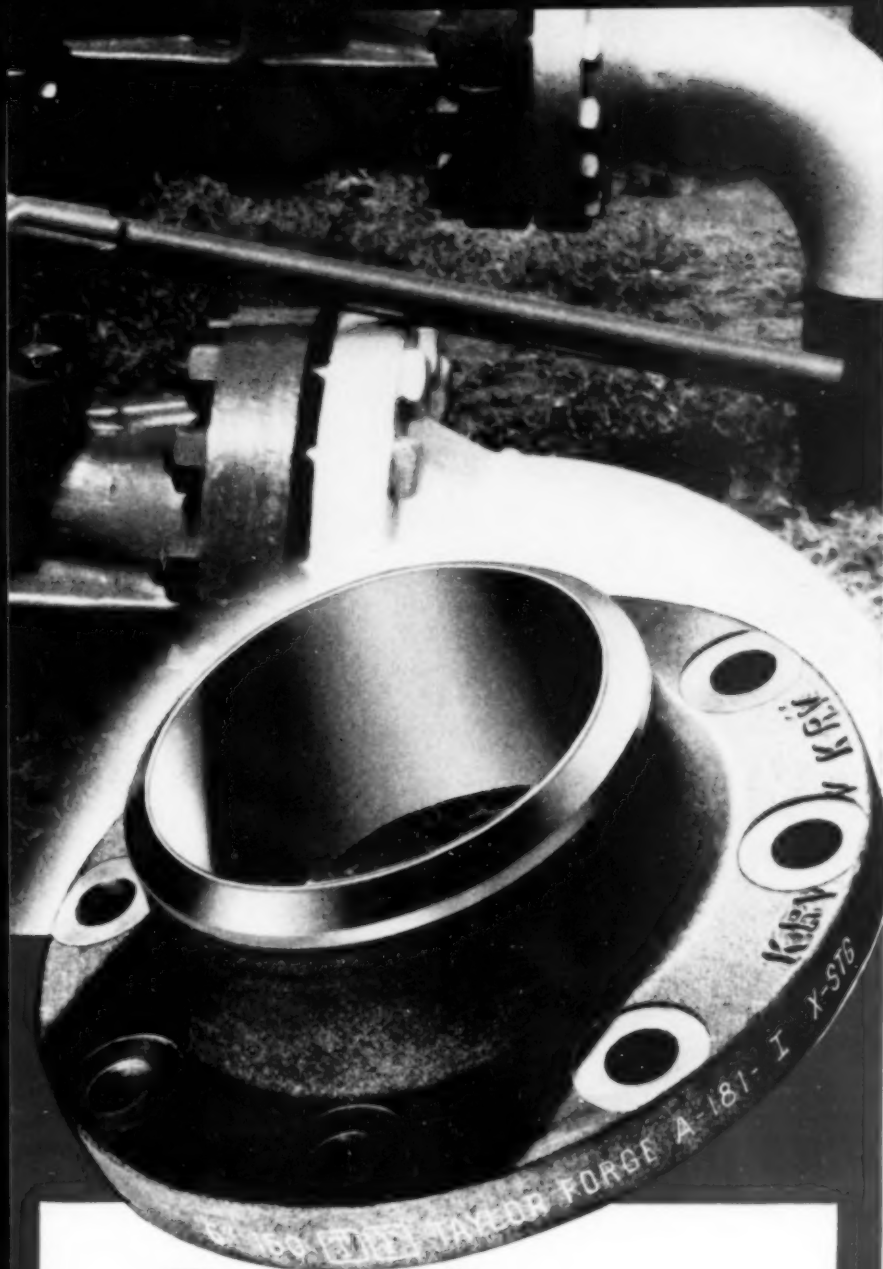


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First in flanges—

No organization has been so closely identified with the development of forged steel flanges as Taylor Forge. No organization or individual has had so much to do with the study of design, strength, bolting practices, and the establishing of flange standards.

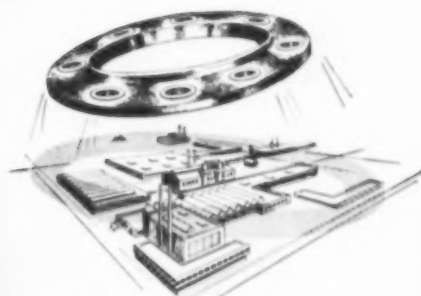
Taylor Forge started first and has remained first . . . in scope of flange types, sizes, weights, and materials . . . in volume produced.

See your Taylor Forge Distributor for up-to-the-minute facts.

TAYLOR FORGE

TAYLOR FORGE & PIPE WORKS • General Offices and Works: P.O. Box 485, Chicago 90, Illinois

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A flange with a future—

Even though no one knew it at the time, the year 1905 was a significant year for Taylor Forge.

It was the year that Taylor Forge began the making of forged steel flanges.

The beginning was modest enough. Taylor Forge simply started out to make flanges for Taylor Spiral Pipe because the only flanges then available—cast iron flanges—had proved unsatisfactory. But it was soon apparent that the men at Taylor Forge had built better than they knew. In just a few years, the new and stronger Taylor Forge Flanges were in demand everywhere—not just for Taylor pipe, but for all types of pipe used by U. S. industry.

It was also apparent that the forging of flanges had taken Taylor Forge into the dawning field of designed piping. Pressures were beginning to climb. Knowledge of how to contain them was needed. By 1920, the late J. Hall Taylor and his associates began the intensive research that was to make Taylor Forge not only the world's largest manufacturer of forged steel flanges, but also the foremost contributor to flange design and standards.

In the mid-20's, big strides were made in flange development to meet the broadened needs of the growing petroleum industry. By 1927, as the reward of long, intensive research, the authoritative Taylor-Waters formula was published. This research work demonstrated the design advantages of the hub type flange and provided the means for producing flanges accurately proportioned for strength combined with economy.

Most of this research had been concerned with the American Standards—flange sizes through 24"—but in 1938 Taylor Forge published the first edition of its widely consulted "Modern Flange Design," based on methods proposed by E. O. Waters, D. B. Rossheim, D. B. Westrom and F. S. G. Williams, manager engineering standards, Taylor Forge (ASME Trans. Apr. 1937). It provided the first complete analyses of the effects of tapered hubs on flange strength and thus opened the way to predetermine design requirements of flanges of all types.

(An episode in the story of Taylor Forge leadership in designed piping)



Forty years of research made this book possible. It is available to those interested in flange design.

R/M's **BIG 7** Packing Types meet 95% of all packing needs



Rotary pumps like this one, which handles 10 gallons of highly viscous materials (10,000 SSU) per minute at 1200 rpm, give top performance with R/M No. 376, a packing included in Type 4 of R/M's Big 7 Packing Types.

Let R/M packings protect your machines

Increased machinery protection is one of the very real advantages you get when you standardize on R/M's Big 7 Packing Types. The reason is that they're engineered to give custom-built performance in all but the very rarest packing applications. You can also count on this basic line of just seven field tested packings to lower

your maintenance costs, cut your downtime, reduce your inventories, and simplify your ordering. It will enable you to practice preventive rather than corrective maintenance. The entire requirements of your plant can probably be met with just three or four of R/M's Big 7 Packing Types. For details, see your R/M distributor.

R/M PACKINGS FOR MAINTENANCE PURPOSES ARE SOLD ONLY THROUGH AUTHORIZED R/M DISTRIBUTORS



RAYBESTOS-MANHATTAN, INC., PACKING DIVISION, MANHEIM, PA.

BIG 7 PACKINGS

FACTORIES: Bridgeport, Conn.; Manheim, Pa.; No. Charleston, S.C.; Passaic, N.J.; Neenah, Wis.; Crawfordsville, Ind.; Peterborough, Ontario, Canada.

RAYBESTOS-MANHATTAN, INC., Packings • Asbestos Textiles • Industrial Rubber, Engineered Plastic, and Sintered Metal Products • Abrasive and Diamond Wheels • Rubber Covered Equipment • Brake Linings • Brake Blocks • Clutch Facings • Fan Belts • Radiator Hose • Bowling Balls

Have you a fly ash recovery problem?

Bring it to

WESTERN PRECIPITATION

... The Only Organization With Years
Of "Know-How" In BOTH Electrical
And Mechanical Recovery Methods!

If you have any kind of a suspension-recovery problem—whether dust, fly ash, fume, fog or mists—it will pay you to bring it to the leading organization in the field... WESTERN PRECIPITATION CORPORATION. Western Precipitation not only pioneered, over 44 years ago, the first commercial application of the now-famous COTTRELL Electrical Precipitators, but also has been a leader for many years in the mechanical recovery field with its widely-accepted MULTICLONE Collectors.

Result:

Western Precipitation is unsurpassed in the all-important factor of "know-how" in BOTH the electrical and mechanical fields... knows from years of first-hand experience whether your particular problem can best be solved by mechanical or electrical methods—or by a combination of the two... can give you a direct and unbiased recommendation on the matter... and then can provide the complete installation under one responsibility, one overall performance guarantee, even where Combination Multiclone-Precipitator (CMP) installations are made!

Western Precipitation products and services include...



COTTRELL

Electrical Precipitators

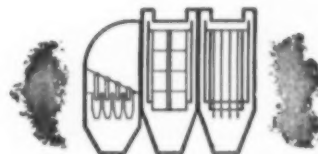
... the most efficient recovery equipment for high recovery, long life, low maintenance on practically any type of suspensions, wet or dry. COTTRELLS can be designed to handle a few c.f.m.—or millions—with equal ease, and at virtually any operating temperature. Recovery efficiencies closely approach 100% recovery, if desired, with very low draft loss, minimum power costs and negligible labor costs. By all standards, Western Precipitation COTTRELLS give highest recovery at lowest cost per-year-of-service!



MULTICLONE

Mechanical Collectors

... the most efficient, most compact, most trouble-free mechanical equipment for recovering suspensions from gases. Because of their unique small-tube design, MULTICLONES are unsurpassed in mechanical recovery efficiencies—require less space, less maintenance, and are far simpler to install. No filters or screens to replace, nothing to burn or cause fire hazards, no high speed moving parts to repair or replace. These and many other advantages make MULTICLONE Collectors the logical choice on installations where mechanical recovery is selected.



CMP UNITS

(Combination Multiclone-Precipitator)


... combine, in one compact installation, both mechanical and electrical recovery principles so that maximum benefit is obtained from the advantages inherent in each method. The MULTICLONE section centrifugally removes the larger and heavier suspensions (down to a few microns in diameter)... and the COTTRELL section then electrically removes the very small particles remaining in the gases. Thus, the bulk of the recovery is obtained with relatively low-cost equipment, and the final clean-up is obtained with equipment having unusually high recovery efficiency—approaching theoretically perfect, if desired.

The recovery of suspensions from gases is a highly exact science and every problem is different. Some require mechanical methods—others electrical methods—still others a combination of mechanical and electrical methods in proper balance to meet the individual requirements of each application. No matter what your problem, remember that only Western Precipitation has had years of field experience in BOTH mechanical and electrical methods!

Let our experienced engineers study your recovery requirements and make an unbiased recommendation on the equipment best suited to your particular problem. A wire, phone call or letter to our nearest office places this unique "know-how" at your service, without obligation.

MULTICLONE—T.M. Reg.

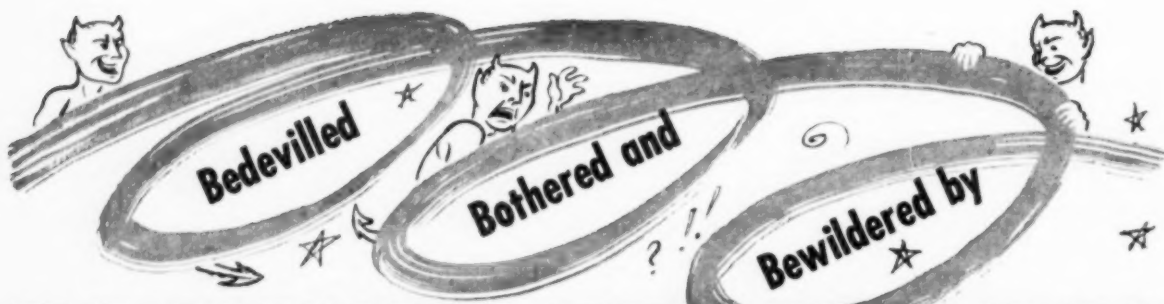
Send for descriptive literature!



**WESTERN
Precipitation
CORPORATION**

DESIGNERS AND MANUFACTURERS OF EQUIPMENT FOR
COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

Main Offices: 1052 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA
CHRYSLER BLDG., NEW YORK 17 • 1 M. LA SALLE ST. BLDG., CHICAGO 2
1429 PEACHTREE ST. N.E., ATLANTA 5 • HOBART BLDG., SAN FRANCISCO 4
PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL



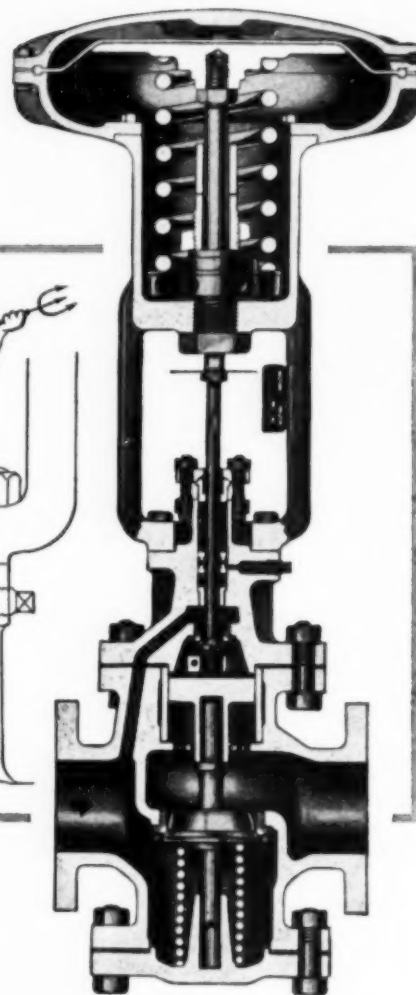
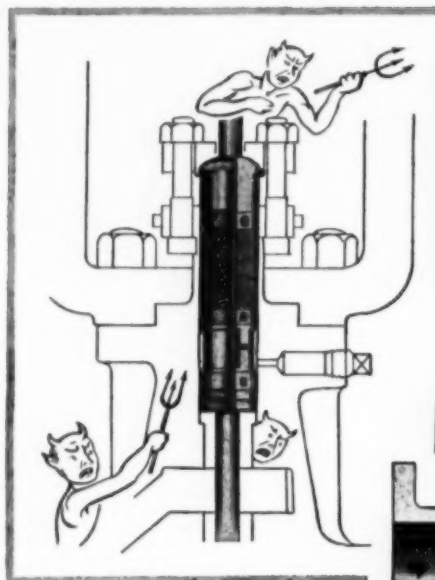
PACKING PROBLEMS?

The new Leslie Lubrisoft® Packing now standard in all Leslie Diaphragm Control Valves is recommended for valve body temperatures up to 500° F. *without external lubrication*. When used with the Leslie thermo-isolating bonnet, it may be used for valve body temperatures up to 1050° F., eliminating need for external lubricators and isolating valves in most applications.

LESLIE LUBRISOFT® PACKING "BEATS THE DEVIL" OUT OF ALL 8 MOVING STEM SEAL PROBLEMS

Each of the several types of Lubrisoft split ring packing is specifically designed to maintain the low-friction stem seal against one or more of these deteriorative service conditions:

1. Internal pressure, temperature and fluid
2. Contamination
3. Corrosion
4. Electrolytic Action
5. Oxidation
6. Extrusion
7. Abrasion
8. Friction



Overall result is a standard, economical packing, with superior stem sealing properties and long service life. Precision fabricated to conform exactly to the deep stuffing box dimensions, the positive, split ring design makes fast replacement possible, without disturbing body or stem adjustment.

Plan to reduce control valve maintenance costs by sending for Bulletin 5304 Diaphragm Control Valves.

LESLIE CO., 261 GRANT AVENUE • LYNDBURST, NEW JERSEY

LESLIE  **VALVES**

"STILL FAR AHEAD IN QUALITY AND PERFORMANCE"



Freight cars can be lazy, too!

MOST FREIGHT CARS don't have a lazy bone in their body. Still, there are exceptions. A few shirkers would like to loaf in the yards or on a siding—or travel "light", only partially loaded. But they're finding it mighty hard to get away with it on the Southern these days!

Once again breaking away from inadequate "traditional" methods, we've created a new organization to study car supply procedures and practices around the clock and streamline freight car distribution all along the line. Already this innovation has led to far better availability of empty cars for loading—and faster, more dependable movement of loaded cars.

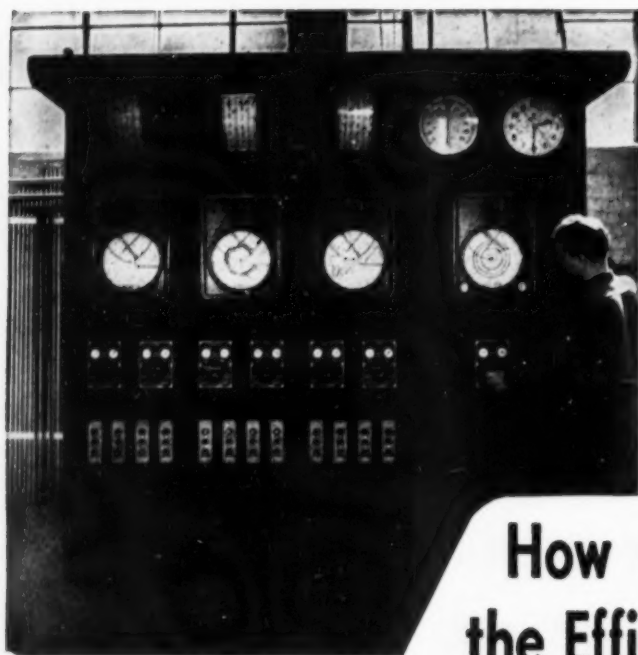
We're taking a good searching look at *all* of our "we've-always-done-it-that-way" practices. This keeps us on our toes—and it gives you better, ever-improving service.



Henry A. DeBatta
President

SOUTHERN RAILWAY SYSTEM

WASHINGTON, D. C.



These Bailey Boiler Controls at the Chicago Pneumatic Tool Company's new plant in Utica, N. Y. insure efficient operation of three 25,000 lb per hour, 100 psi, spreader stoker-fired boilers.

How to INCREASE the Efficiency of YOUR BOILER-ROOM DOLLAR

Before you get steam you've got to spend dollars—so dollars are a form of energy.

And if your boiler-room dollars are invested in equipment that isn't working efficiently, economically, your "investment" is poor.

That's where co-ordinated controls by Bailey can help. Here's why they'll increase your "boiler-room investment efficiency":

1. Complete Range of Equipment—fully co-ordinated. You need never worry that a Bailey Engineer's recommendation is slanted in favor of a particular type of equipment, just because he has a limited line to sell—or that Bailey will pass the buck for efficient control; we offer *complete* boiler control systems.

2. Engineering Service—backed by experience. No other manufacturer of instruments and controls can offer as broad an experience, based on successful installations involving all types of combustion, flow measurement and automatic control.

3. Direct Sales-Service — conveniently located near you. Bailey Meter Company's sales-service engineers are located in more

industrial centers than those of any other manufacturer of boiler control systems; you get prompt, experienced service with a minimum of travel time and expense.

For better "boiler-room investment" efficiency—for more power per fuel dollar, less outage and safer working conditions, you owe it to yourself to investigate Bailey Controls. Ask a Bailey engineer to arrange a visit to a nearby Bailey installation. We're proud to stand on our record: "More power to you!"

A-111-0

**BAILEY
METER
COMPANY**

1028 IVANHOE ROAD
CLEVELAND 10, OHIO

Controls

for Steam Plants
COMBUSTION - FEED WATER
TEMPERATURE - PRESSURE
LIQUID LEVEL - FEED PUMPS

SARCO

A complete line of steam traps,
temperature controls & heating specialties

Here are a few

STEAM TRAPS



Thermostatic



Float-Thermostatic



Camlift Bucket



Liquid Expansion



Thermodynamic

The right trap for each job . . . Only Sarco offers 5 functionally different types — not variations of one type!

TEMPERATURE CONTROLLERS



Heating



Cooling



Heating or Cooling



Air Temperature

ELECTRIC-THERMOSTATS AND VALVES



Indicating



Non-Indicating



Solenoid Valve



Motor Valve



Room Thermostat

AIR ELIMINATORS AND STRAINERS



Air Eliminators



Strainers



Scraper Strainers

OTHER HEATING SPECIALTIES



Radiator Valves



Radiator Traps



Water Blenders



Air Traps



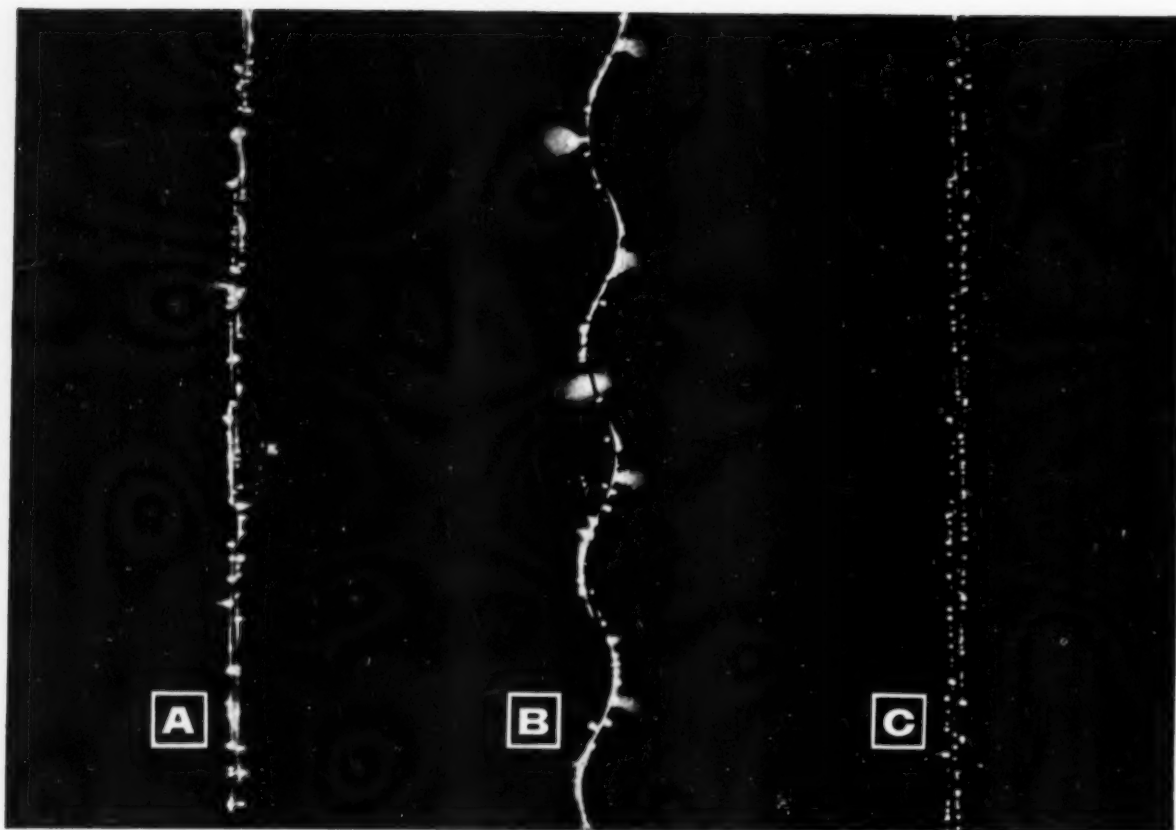
Thermometers

BULLETINS

Send us data concerning your installation; we'll gladly send you bulletins and case histories. Sarco Company, Inc., Empire State Bldg., N. Y. 1, N. Y.

SARCO **SAVES STEAM**

2071-B



The **A B C** of Electric Precipitation

The efficiency of *any* electric precipitator depends on the quality of the corona emission from the electrode, for it is this emission that 'charges' the dust.

Pictured above are the three most frequently used electrodes for doing this job. You can see the quality of the corona for yourself. We'll be glad to give you an actual demonstration.

Other precipitators use electrodes A and C which give off only fair emission. Use of fine wire (to increase emission) leads to structural weakness. Use of heavy wire (to give strength) means poor emission.

The exclusive Buell Spiralectrode (B) combines strength with peak emission.

The outstanding on-the-job performance of the new Buell Spiralectrode is typical of the advances made by Buell Engineers. Con-

tinuous-cycle rapping, for example, proved in service for 20 years has *never* caused "puffing".

Buell has consistently led the way to greater efficiency, through a long series of technical discoveries and advances, in all types of dust collection.

Get all the facts. Send for our informative brochure—The Collection and Recovery of Industrial Dusts. It explains all three Buell Systems of industrial dust collection. Send for your copy today. Write Dept. 80-I, Buell Engineering Company, 70 Pine Street, New York 5, New York.

buell



20 Years of Engineered Efficiency in
DUST COLLECTION SYSTEMS

2 New Services from Crane

How to Choose the Right Valve for Each Piping Job

1 SOUND MOVIE FOR GROUP SHOWINGS

2 20-PAGE
"TAKE-HOME"
HANDBOOK

HOW TO GET THESE FREE HELPS

Easiest way: phone your local Crane Representative—let him schedule a film showing for your group and supply the "take-home" handbooks. If more convenient, just drop a line to the address below.

Men responsible for specification, operation, and maintenance of industrial piping systems will get a real "refresher" from these new Crane customer services. Both film and handbook deal with the common problems of matching up valve characteristics and specific flow control needs for the most efficient result.

Following a review of basic valve types—gate, globe, angle, and check—variations in design of functional parts, and the effects on serviceability are discussed. All vital elements—disc and seating—disc-stem connection, bonnet joint, stem operation, etc., are covered. The motion picture stimulates high interest by developing a hypothetical case involving strong differences of opinion on valve selection. The manual—intended for distribution at film showings or for independent use—provides a lasting reference.

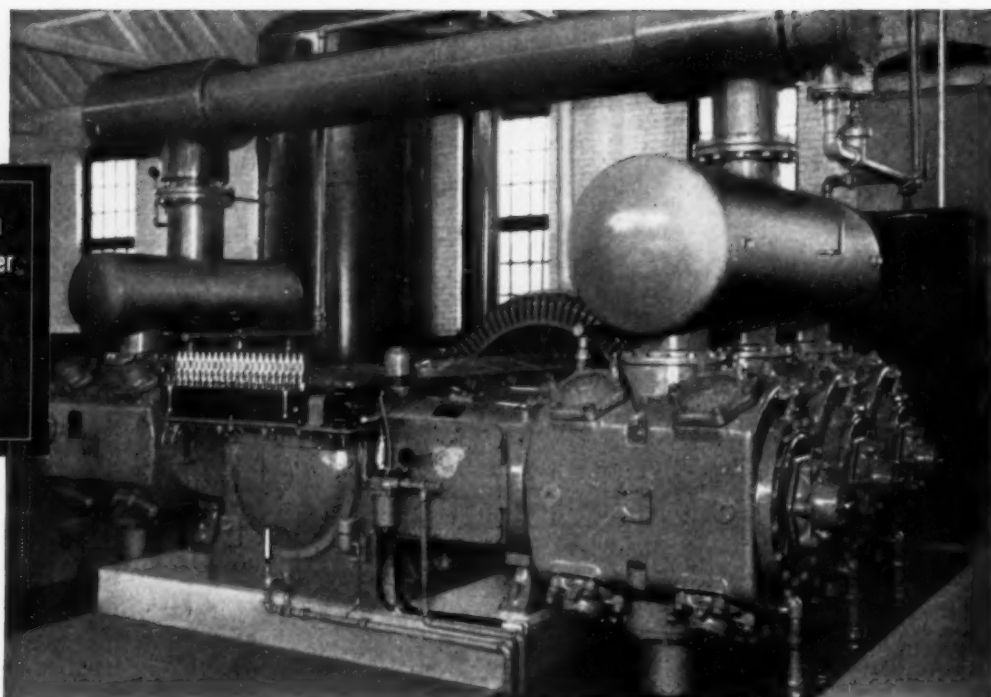
THE BETTER QUALITY... BIGGER VALUE LINE... IN BRASS, STEEL, IRON

CRANE VALVES

CRANE CO., General Offices: 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

Over 6 million
Cooper-Bessemer
Compressor
Horsepower
NOW IN USE!



Why Air Costs Less at Newark Stove

Recently installed in Newark Stove Company plant, Newark, Ohio, this is a Cooper-Bessemer 800 hp Type FM compressor with 5 balanced-opposed compressor cylinders.

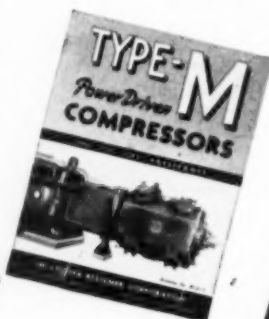
Add up the advantages of this modern-type Cooper-Bessemer compressor, and you'll see why it does a *low-cost* job, year in, year out.

For example, with balanced, opposed action, it's the smoothest running compressor money can buy . . . and that means continuous, vibration-free operation with less repair, less maintenance.

For another thing, Cooper-Bessemer design offers unusual compactness. Foundation and piping requirements are correspondingly less. No need for a deep motor pit.

But check up further. Look into the many construction features, found only in Cooper-Bessemers, that are your *best* guarantee of permanent satisfaction.

SEND FOR THIS BULLETIN . . . it gives details and pertinent data on the Cooper-Bessemer power-driven Type M compressors, 350 to 1,000 bhp.



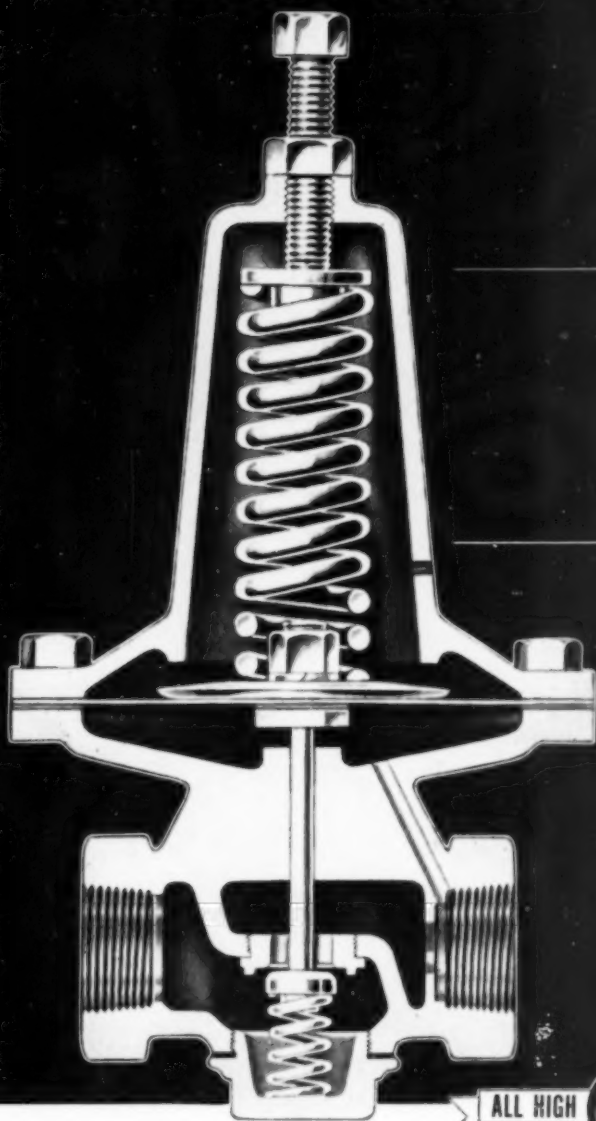
The
Cooper-Bessemer
Corporation

MOUNT VERNON, OHIO — GROVE CITY, PENNA.

New York Washington, D. C. Bradford, Pa. San Francisco Houston,
Dallas, Greggton, Pompa and Odessa, Texas Seattle Tulsa Shreveport
St. Louis Los Angeles Chicago Caracas, Venezuela Cooper-Bessemer of
Canada, Ltd., Halifax, Nova Scotia Gloucester, Mass. New Orleans, La.

MASONEILAN No. 33

FOR SMALL
STEAM LINES



Takes the SHAKES Out of Pressures

Here's an accurate, tight-closing reducing valve for small steam or air systems. Designed for a wide range of adjustment, Masoneilan No. 33 is a versatile, dependable way to keep line pressures constant.

Simplifies Maintenance

Easy to install, adjust and service, Masoneilan No. 33 reduces maintenance to a minimum. Stainless steel valve plug and seat ring assure long life. All parts are removable with valve in the line.

Available for initial pressures up to 200 lbs., reduced to any pressure from 2-20 lbs., 20-60 lbs., 60-100 lbs. Sizes $\frac{1}{4}$ " to $\frac{3}{4}$ ". For more information write Mason-Neilan Regulator Company, 1206 Adams Street, Boston 24, Mass. . . or see your local industrial distributor.

ALL HIGH



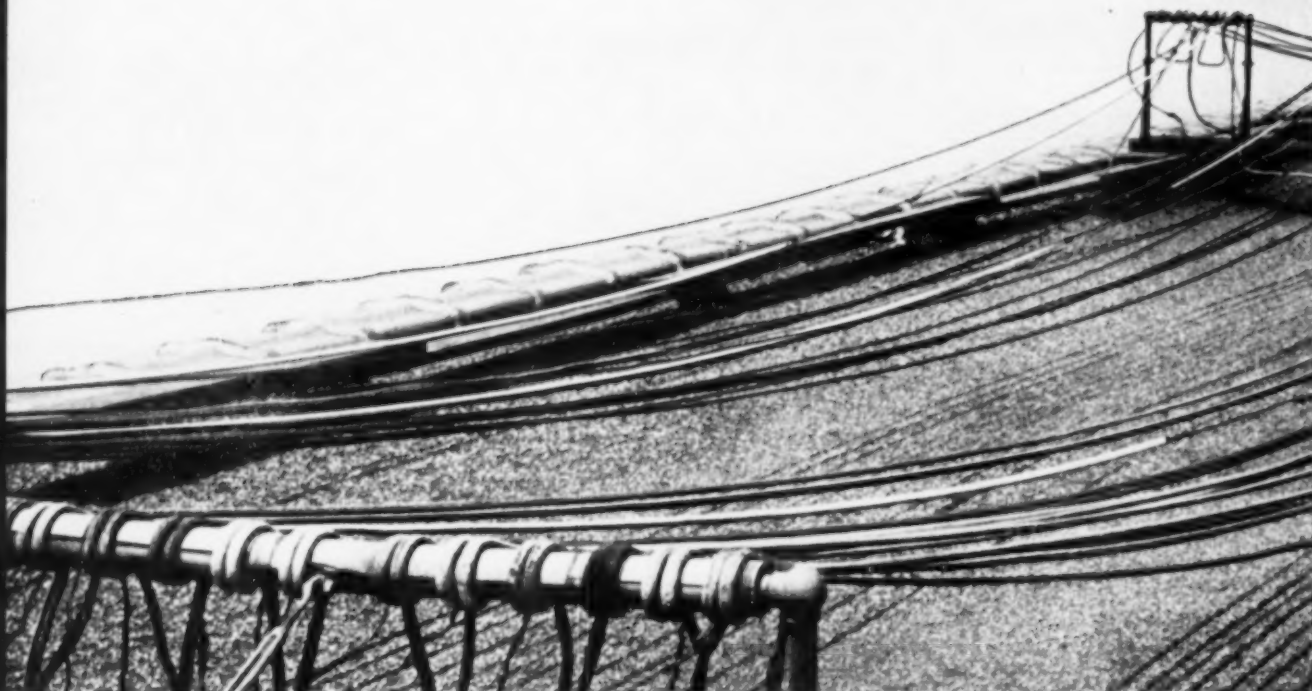
PRODUCTS



No. 11 for steam No. 21 for air No. 227 for water No. 33 for steam, air

MASONEILAN REGULATORS

Keep Pressure Under Control!



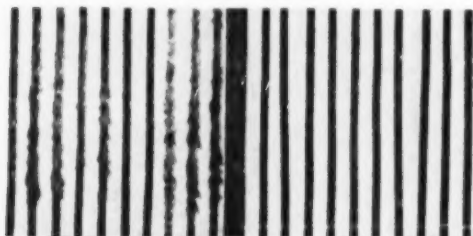
Anaconda's exposure rack at Hastings-on-the-Hudson. This rack is used to study the effects of *natural aging* on wire and

HERE—Duraline passes the toughest

*20 years on a torture rack—Duraline licks acrid smoke,
salt air, sunlight, ice and snow*

How do you test weatherproof wire? By accelerated test in the laboratory? By long exposure to *natural* conditions?

At Anaconda we take both courses. Acceler-



Some standard types (above), after severe aging test, begin to come apart and festoon.

Unretouched photograph shows that Duraline (above), after exposure to severe aging, remains completely weathertight.

ated tests tell us many things — and tell us quickly. But the most reliable test of all—true, infallible—is *the test of time*.

Duraline® is the *one* weatherproof wire that has *passed* this test!

In 1934, hundreds and hundreds of feet of Duraline were installed on special outdoor racks at Anaconda's plant on the Hudson River. In the 20 years since, this wire has been subjected to the most corrosive conditions possible: acrid industrial smoke, salt mist, rain, scorching sun in summer, and ice and sleet in winter.

This wire still stands today. And Duraline shows absolutely *no sign* of deterioration . . .



cable coverings. Duraline—on the rack for 20 years—shows no sign of future festooning.

test of all: THE TEST OF TIME

not the slightest sign of future festooning. This after 20 years!

ALUMINUM OR COPPER

Only Anaconda makes a line wire like Duraline. Your choice of aluminum, copper or copperweld conductor. Ask your Anaconda Salesman or Distributor for full information and an actual sample to look over. Or write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

*Reg. U.S. Pat. Off.

DA377

DURALINE

WEATHERPROOF LINE WIRE

ANACONDA®

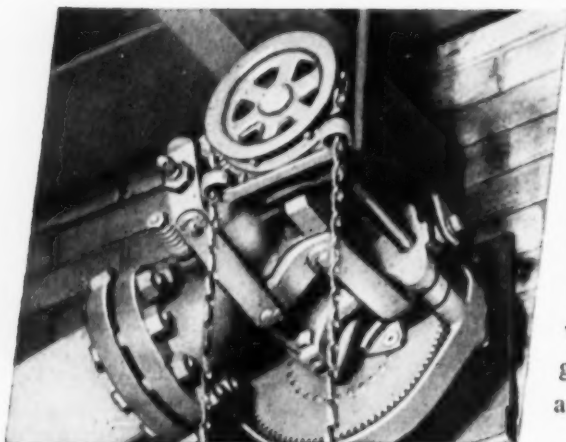


Duraline eliminates festooning, and reduces grounds and shorts in wet, windy and icy weather due to contact with foreign objects. The reason is Duraline's unique construction.

1. Outer braid, URC saturated and finished. Experience shows this covering gives finest weather protection.
2. Note *continuous* sheath of interlocked and felted, fibrous material. Water cannot "wick" through it.
3. Aluminum, copper or copperweld conductor.

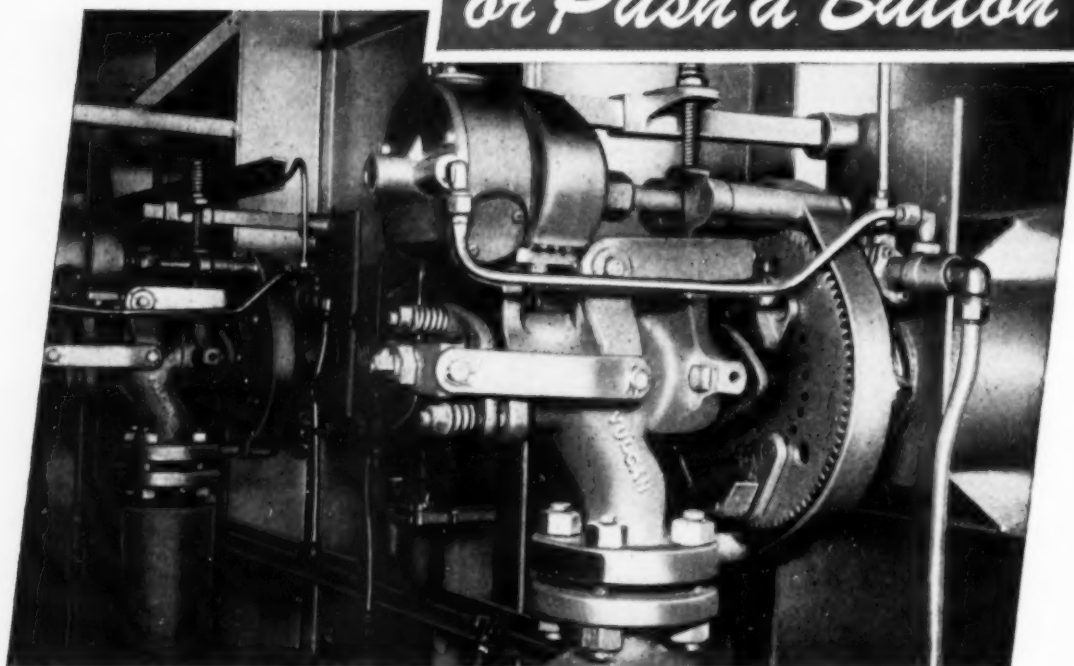
Pull a Chain

for full 360° boiler cleaning



Hand-operated or motor-driven—every Vulcan Rotary Soot Blower gives exactly the same 360-degree cleaning action. In fact, you can change a manually-operated Vulcan Rotary to an automatic unit by merely replacing the sheave wheel with an air or electric motor, and adding a control block. Uniform blowing pressure—from start to finish of the cycle—is assured by an exclusive trigger-action valve. And this valve seals off corrosive furnace gases from internal parts. For better boiler cleaning at low cost, depend on Vulcan.

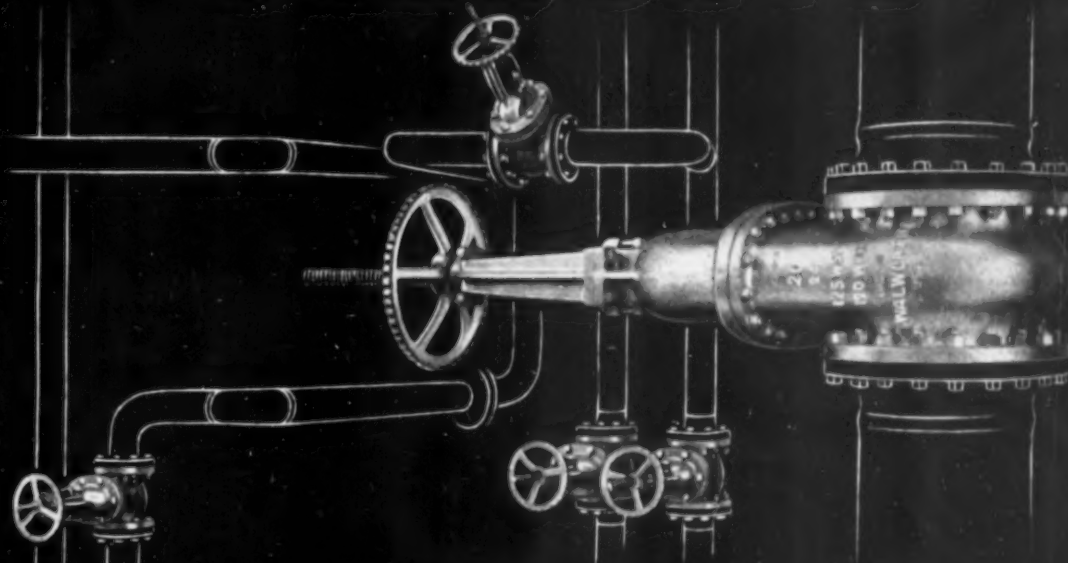
or Push a Button



COPES-VULCAN DIVISION, Continental Foundry & Machine Company, ERIE 4, PA.

VULCAN Rotary SOOT BLOWERS

WALWORTH

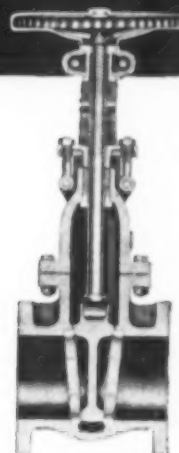


IRON BODY WEDGE GATE VALVES

Better because ...The entire valve, from hand-wheel to seat rings, is ruggedly constructed to withstand rough and frequent usage. Body, bonnet, and yoke are sturdy castings with large radius fillets. Dimensions and drilling of end flanges are in agreement with American Cast Iron Flange Standards. Stiffening ribs connect end flanges with the body neck to maintain a rigid connection with piping.

A wide range of Walworth Iron Body Wedge Gate Valves is available—through your Walworth Distributor—from which you can choose the right type to meet your most exacting conditions. Saddle-type valves as small as $\frac{1}{4}$ -inch; low pressure valves for water and gas pipelines up to 36 inches.

Whenever you need valves and fittings, choose from complete lines—in a variety of metals—manufactured by Walworth. For more information, see your Walworth Distributor or write: Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.



Walworth No. 726F OS&Y (Outside Screw and Yoke) Iron Body Wedge Gate Valve. OS&Y valves are recommended for services where it is desirable that the line fluid does not come in contact with the stem threads. Note the swing-type gland-eye-bolts for easy repacking. Sizes 2 to 30 inches.

WALWORTH

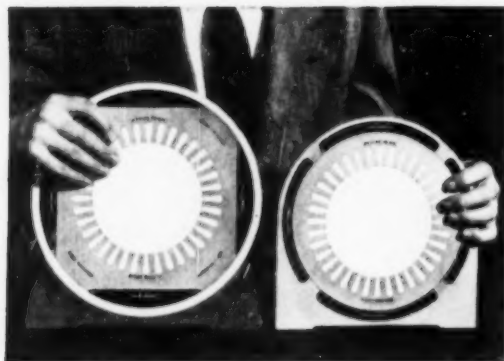
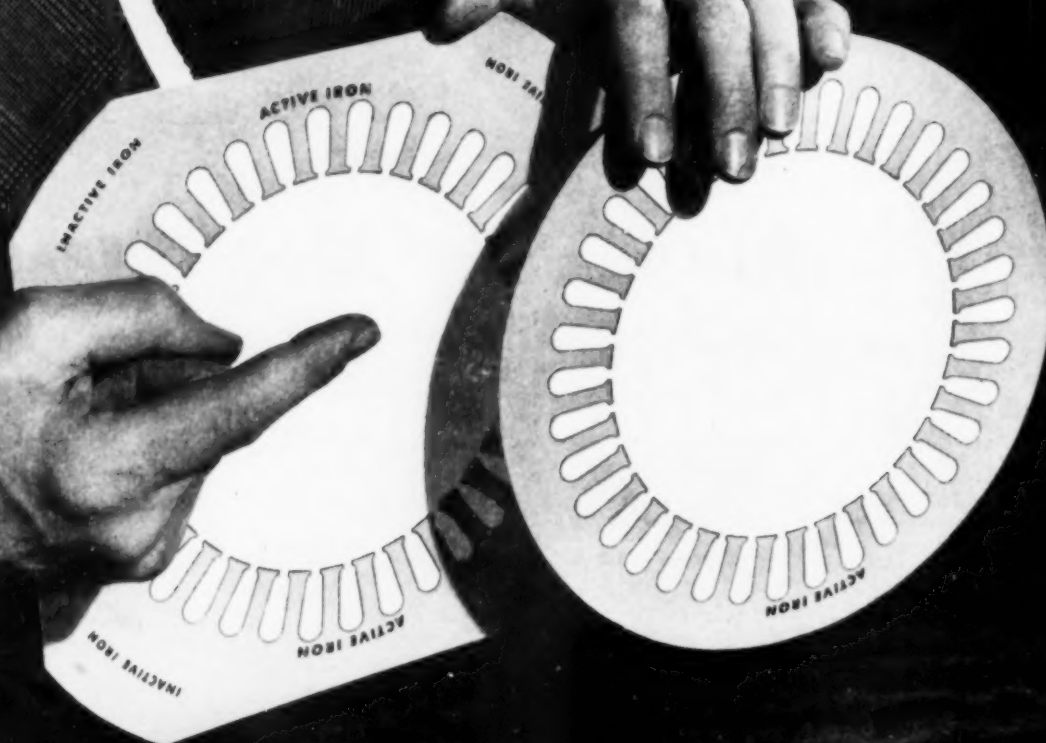
Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

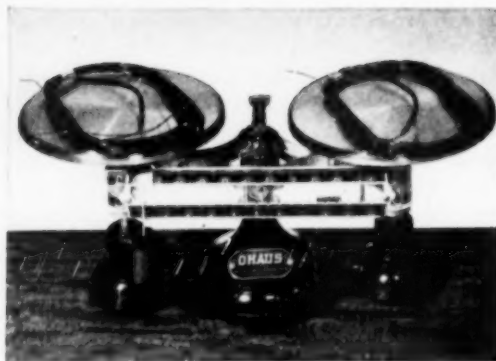
60 East 42nd Street, New York 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

Here are laminations from two 5-hp Life-Line motors. Note that only the inactive support corners of the original Life-Line square stator have been eliminated from the round stator of the Life-Line "A" motor.



When the stators are placed in their respective frames we see how the Life-Line "A" size reduction has been accomplished without sacrificing active magnetic steel. Excess air space has been eliminated also.



Copper, the other important active material, has not been sacrificed. The coil on the left is from an original Life-Line motor. The coil on the right is from a new Life-Line "A" motor. Both weigh the same.

Here's how more horsepower has been put in the *Life-Line A* motor

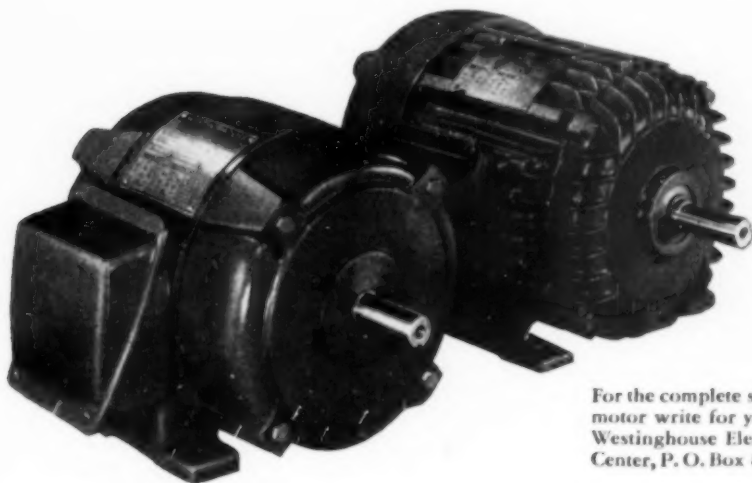
These demonstrations show
how motor performance
is determined by "active" material



Perhaps you are a motor user who has raised the question: "How can you shrink the size of a motor and still equal or better the original performance?" Let's look inside a motor to find the answer.

The performance of any motor is dependent upon its active material—the magnetic steel and copper. Take the original Life-Line[®] and the new Life-Line "A" for example. The amount of magnetic steel in the stator and rotor and the copper in the coils of both Life-Line designs are the same. The reduction in size has been accomplished by eliminating inactive material and space. Thus you have a smaller motor whose basic electrical performance remains unchanged. In fact, the Life-Line design principle has been proved in service for over seven years.

J-21848



For the complete story on the new Life-Line "A" motor write for your copy of Booklet B-6154, Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa.

YOU CAN BE **SURE**...IF IT'S
Westinghouse



**PROCESS
CHANGES
CAN'T OBSOLETE
THIS TRANSMITTER...**



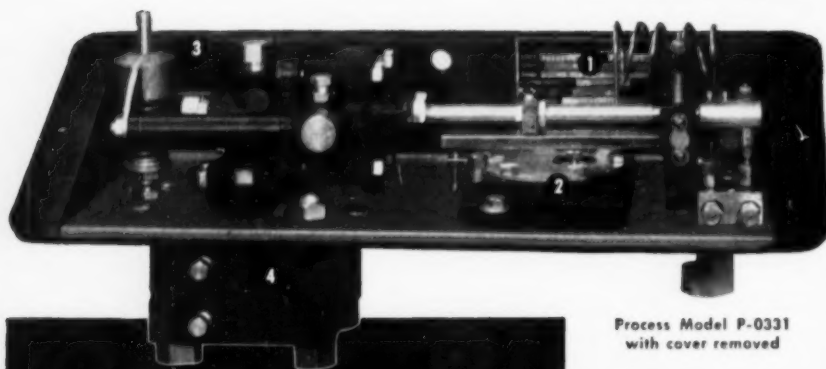
**① 10-1 RANGE CHANGE
—NO CHANGE OF PARTS**

Double weighing beam construction on many models permits range changes as much as 10-1, just by turning a set of locking nuts to change a fulcrum point.

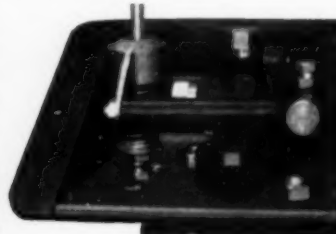


**② ADDITIONAL 16-1 RANGE
CHANGE—STILL NO PARTS
CHANGE**

Range may be changed on all models by loosening retaining bolts and sliding the reaction chamber to a new leverage position. Reaction area may be changed for further range change.

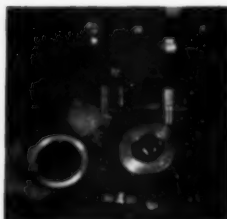


Process Model P-0331
with cover removed



**③ SUPPRESS, COMPOUND
OR REVERSE RANGES**

Balancing spring, installed to exert either an upward or downward force on transmitter weighing beam, quickly converts transmitter for range suppressions up to 80% of total range, for reversed ranges or for compound ranges where pressure fluctuates above and below atmospheric pressure.



④ MAJOR RANGE CHANGES

Range change plates may be easily inserted or removed from measuring chamber to change the effective diaphragm area for major range changes. Similar plates may be used also in the reaction chamber for further range change.

REPUBLIC PNEUMATIC
TRANSMITTER
with
EASY RANGE CHANGE

Here's the pneumatic transmitter for measuring differential, flow, pressure or level that saves you time and money when operating conditions are not definitely known or processes are likely to be changed. Extreme flexibility of design lets you adapt the same transmitter chassis for almost any range of measurements—often without any change of parts.

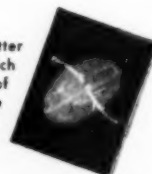
Process Model pictured above has a differential range of 0-12" H₂O minimum and 0-880" H₂O maximum at operating pressures to 1500 psig. Other models are available for differential ranges as low as 0-0.6 H₂O or as high as 0-750 psi.

Transmitters may be constructed of special materials to handle almost all types of corrosive fluids. Ruggedly built, they give long service out-of-doors. Accuracy is guaranteed at 1/2% of full range on standard models.

Republic transmitters are used in process, chemical and petroleum plants all over the country. Investigate their advantages for your plant.

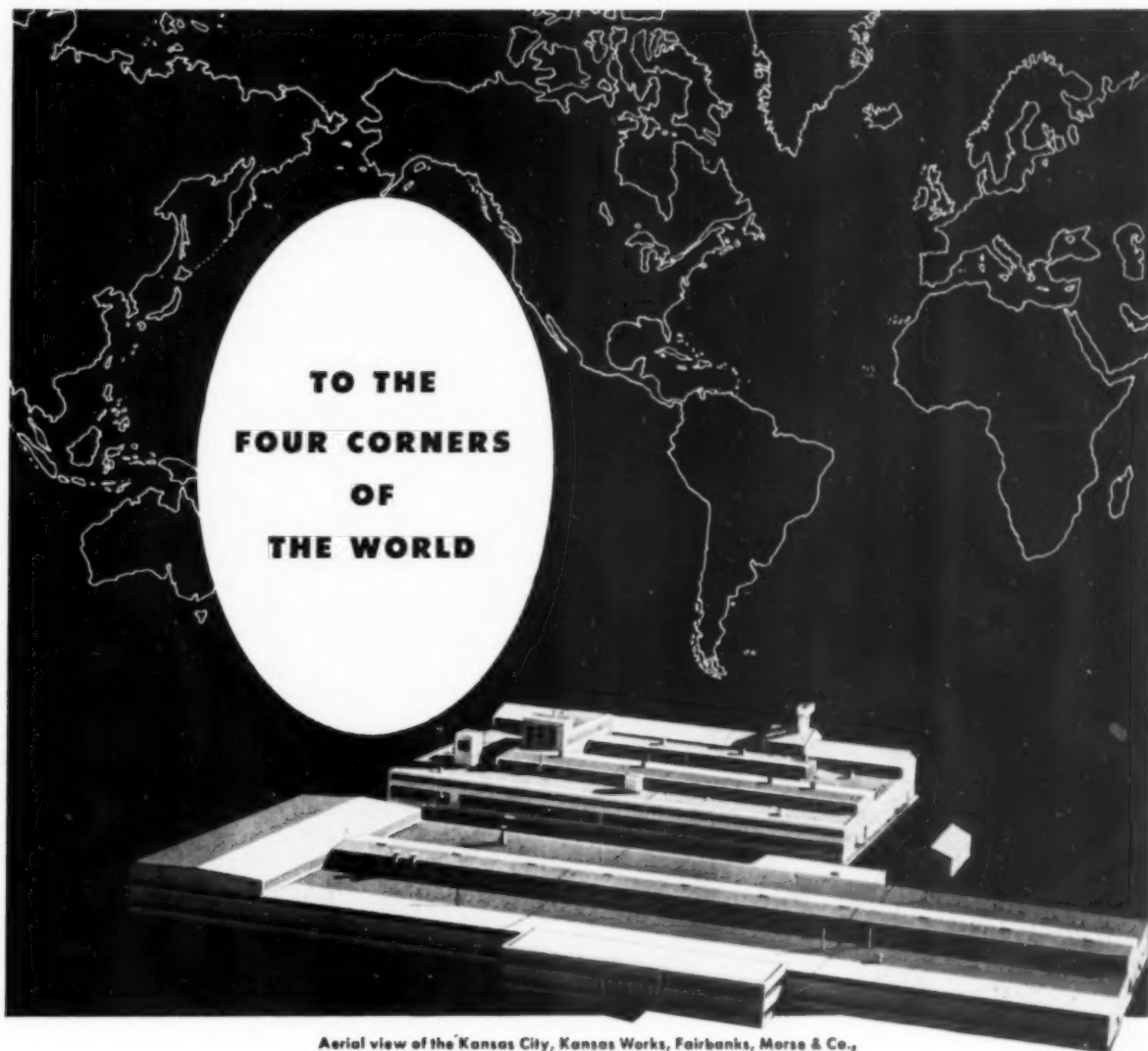
FREE DATA BOOK

Get the full story about Republic transmitter flexibility. Send for free Data Book which gives all the facts about complete line of Republic transmitters, including Square Root Extracting and Pneumatic Electric models.



REPUBLIC FLOW METERS CO.

2240 Diversey Parkway, Chicago 47, Illinois



Aerial view of the Kansas City, Kansas Works, Fairbanks, Morse & Co.,
3601 Kansas Avenue.

...from Kansas City

Yes, from our new, modern-as-tomorrow works at Kansas City, we serve the world's needs for pumps.

As a major supplier of quality pumping equipment, it is particularly suitable that this new Fairbanks-Morse plant be located at an important crossroads of the world . . . Kansas City. In this new plant 190,000 square feet of manufacturing space and a complete foundry occupy-

ing 150,000 square feet are devoted to bringing better service to our customers all over the world.

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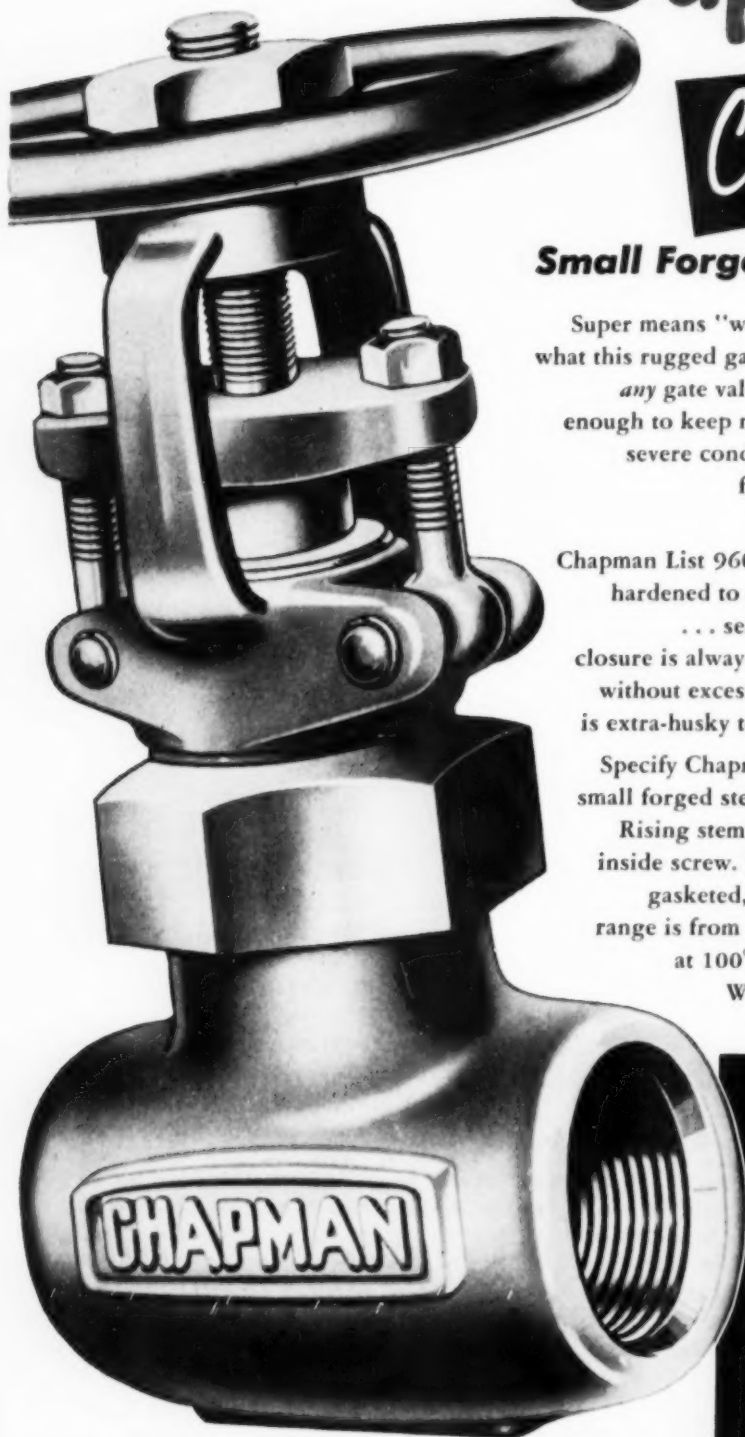
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SOUTHERN POWER & INDUSTRY for SEPTEMBER, 1954

51

Super Tough

Chapman List 960



Small Forged Steel Gate Valve

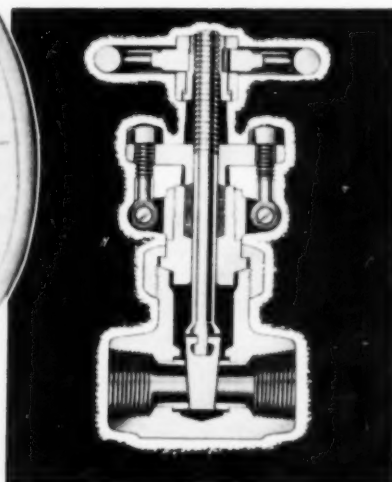
Super means "way beyond the ordinary" and that's just what this rugged gate valve is . . . it's tough enough to lick *any* gate valve problem in its range . . . dependable enough to keep maintenance costs down under the most severe conditions. That's why List 960 is specified for more different applications than any other valve of its kind.

Chapman List 960 is tough because . . . wedge faces are hardened to 800 Brinell, so they won't seize or gall . . . seat rings are hardened stainless steel, so closure is always tight and operation is always smooth, without excessive wear . . . stem-and-gate connection is extra-husky to stand up under even unusual stresses.

Specify Chapman List 960 for every use you have for small forged steel gate valves. In sizes from $\frac{1}{4}$ " to 2".

Rising stem with yoke (shown) or rising stem with inside screw. Bonnet joint is either metal to metal or gasketed, depending upon application. Pressure range is from 380 pounds at 1000°F to 2000 pounds at 100°F. For higher ratings, specify List 990.

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TIMELY COMMENTS



HOW MUCH Must We Learn?

Technical magazines . . working engineer's best source of information

HOW much must we learn about ATOMICS? Only a few years from now most power engineers will know something about REACTORS, and most industrial engineers will be fairly familiar with RADIOISOTOPES. But the probability is that relatively few will need to become technically trained NUCLEAR scientists in order to properly perform their plant duties.

Gradually the physicist and chemist will evolve techniques and standards that together with adequate operating procedures and safety rules will permit the plant engineer to live comfortably with his new servants. Real understanding of what goes on within the atom will continue to be confined to research scientists.

The same is true of steam or electricity—very few plant men would understand laboratory research techniques in either field. And likewise many scientists specializing in those fields would find it very difficult to direct full-scale plant operations economically.

A paragraph from a recent speech by the Assistant General Manager for Research and Industrial Development, United States Atomic Energy Commission, contains some interesting information on the number of specialists in the new field:

"Before 1939 radioisotopes were primarily laboratory tools. There were fewer than twenty-five universities in which radioisotopes were being studied, and fewer than 500 people in the United States that could discuss clearly what went on within the atom. Today we have 3,400 different institutions and about 15,000 persons using radioactive materials. Among them are 860 industrial firms operating 1,100 different plants.

These plants are using radioisotopes for performing production jobs easier, faster and cheaper. The expansion of the industrial use of radioisotopes has been ninefold in the past four years."

Industrial use of radioisotopes will continue to grow at a rapid rate, and nuclear power will take a sudden jump as soon as processes and procedures are somewhat stabilized. Therefore many, if not most, plant engineers will be working with the new science in the near future.

This great increase in activity does not mean however that the number of true scientists in the new field will increase in the same ratio as design and production engineers. Most industrial engineers will find this new field merely adds to their responsibilities. They will accept it, learn a good deal about it, and proceed to put it to work in their plants. But just like steam and electricity—most of the research and development will be left to highly trained specialists.

Young graduates, a few years hence, will have been taught the fundamentals of NUCLEAR science, and most "old timers" will retire before the need for this information becomes pressing. But the in-betweens will need to do a bit of studying.

Right now the working engineer's best real source of information is technical magazines. So articles on radioisotopes and atomic power should not be passed over. Editors are trying hard to be helpful in this early stage of the new science. The plant man will find it relatively easy to learn what he needs to know in ample time to meet plant needs. But he should start learning early so he will be ready for action when these new skills are required.



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INDUSTRY SPEAKS

SOUTHERN POWER
AND INDUSTRY

The "IF" in Peacetime Atomic Power is No Longer Present

Adapted from comments by **EDGAR H. DIXON** before Members' Council of the Chamber of Commerce of the New Orleans Area. Mr. Dixon is president of Middle South Utilities, Inc., and is chairman of the Edison Electric Institute Committee on Atomic Power. The four Middle South operating companies are Arkansas Power & Light Company, Louisiana Power & Light Company, Mississippi Power & Light Company, and New Orleans Public Service, Inc.

TECHNIQUES for peacetime use of nuclear fission have been developed with almost breathtaking rapidity. Not long ago the beneficial use of atomic energy for production of electric power appeared to be little more than a hope and a distant goal. It now appears that this prospect may well become a reality during the business careers of a good many of us.

We are talking about a fuel to complement and supplement those now used in electric generating plants. In an atomic power plant, the nuclear reactor would take the place of the boiler and related equipment and fissionable materials would replace present day fuels. The turbine and generator would be similar to those in use at conventional power plants.

The energy in natural deposits of uranium and thorium is many times greater than that contained in known recoverable reserves of coal, oil and gas. Scientists have learned to use not only the precious fissionable atoms that exist naturally in uranium, but also the more plentiful garden-variety uranium atoms.

By the year 2000 the world may be consuming roughly five times as much energy per year as it is at present. In addition to this expected growth in the demand for energy within the next half century, alternate uses are presenting themselves for our conventional fuels—particularly for an ever-growing list of important chemical products.

The Middle South Area is going to participate fully, and very likely to an above-average extent, in the predicted long-range growth in the electric

power requirements of the nation. This spurs us to explore every feasible means for assuring future fuel security.

We Have Lots to Learn

Those who are most pessimistic in regard to nuclear power possibilities lean heavily on the economics of this energy source to support their case. Reactor experiments to date have not contributed appreciably to an understanding of the dollars and cents of nuclear power production costs. We really have no way of knowing what reactor power costs will be, or how they can be reduced, until appropriate experiments and research have been conducted on a commercial scale.

New projects will seek further progress beyond present design limits with respect to temperatures and pressures of steam. A plant now being designed should reduce the amount of fuel required to make a kilowatt-hour of electricity by some 10% below the best level achieved to date.

Thus the economics of generating from coal, oil or gas can by no means be treated as something static. In budgeting time, effort and money for research aimed at further improvement in the cost of supplying electricity, our industry will investigate the interesting potentials of atomic energy but at the same time will continue to seek progress along more conventional lines.

The Atomic Energy Commission believes that a small number of full-scale privately-owned and operated power reactors are likely to be on the line before 1965. By 1975, from 2% to 10% of our electric power needs may be derived from the atom. Faster introduction may be possible, but in the absence of extraordinary government assistance, which the Commission does not recommend, this schedule seems reasonable on economic grounds.

Also note **ATOMIC ENERGY AND WORLD FUEL RESERVES** starting on page 74. Discussion shows why the future of atomic power is **BIG BUSINESS**.—Ed.

Bark Burning Advances Demonstrated New Paper Mill Installation—Mobile, Alabama

By A. B. STICKNEY

Project Manager
The Rust Engineering Company

Shredded bark is introduced 15 feet above grate, and dries as it falls into a turbulent zone where much of it burns in suspension.

A SUBSTANTIAL portion of the steam required by the process in an integrated pulp and paper mill can be generated by burning bark. Consequently any increase in efficiency in burning this waste fuel results in reduction of the purchased fuel.

In January, 1954, the Chickasaw Mill of The Hollingsworth & Whitney Company, at Mobile, Alabama, placed in operation a new bark burning boiler embodying the latest steps in the evolution of units for the more efficient and economical use of bark as fuel.

The installation, designed jointly by The Rust Engineering Co. of Pittsburgh, Pa., Combustion Engineering, Inc., and Hollingsworth & Whitney Co., and erected by The Rust Engineering Co., employs a Combustion Engineering steam generating unit of a type developed specifically for this service. The prototype unit, incorporating many facilities for experimenting with variations in operating techniques, was installed in 1951, and has been described by Ellwanger¹ in a TAP-PI paper, and by de Lorenzi² in an ASME paper.

Based on experience with the original unit, Combustion has eliminated many of the experimental features, and has made various

changes, in developing a standardized design of which several have been sold.

Since barking drums in a paper mill work only part of each 24-hour day, and are subject to interruptions during their working period, economical utilization of installed boiler capacity dictates use of a supplementary fuel—in this case gas with oil standby.

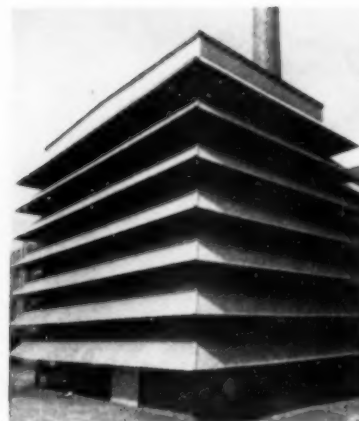
The design steam capacity, burning bark alone is 130,000 pounds per hour, and burning gas alone, capacity is 160,000 pounds. Combination operation gives 100,000 pounds from bark and 60,000 pounds from gas, or a total of 160,000 pounds per hour.

The unit here described is the first of the standardized design to go in service, although one other unit based on the prototype preceded it.

Bark Burning

The present unit employs a high-set spreader, the throwers being 15 ft. above the grate in a 46 ft. high furnace. Shredded bark is thrown into the furnace at this level, and the first step in burning it is direct evaporative drying by contact with the hot products of combustion from the bark burning below it.

As the bark dries it falls into a turbulent zone, where much of the air for combustion is introduced at high velocity through six levels of



Exterior of building.

nozzles, installed tangent to an imaginary vertical cylinder in the furnace. Nozzles in each successive level are directed in opposite directions, so that as the bark falls through successive zones the tendency is to move it first clockwise, then counterclockwise, then clockwise again, etc. This leads to a high degree of turbulence and also prolongs the period the bark is in suspension.

The high turbulence keeps removing the products of combustion from the burning surface and bringing new oxygen to it, permitting completion of combustion with a minimum of excess air. As a result, much of it burns in suspension, and only a fraction of the bark reaches the grate, where it is burned in a conventional way.

Since only a fraction of fuel reaches the grate, and that has been thoroughly dried, only a fraction of the total combustion air need be, or is, introduced through the grate. The grate is of the continuous ash discharge type, discharging to the front. The grate provides a long burning and cooling period before discharging to the ash pit. Combustion is remarkably complete, and most of the ash discharge consists of non-combustible impurities in the bark.

(1) R. Ellwanger, "Suspension Burning of Bark Refuse," Richmond, Va. Meeting of Technical Association of the Pulp & Paper Industry, September 26, 1951.

(2) Otto de Lorenzi, "Turbulent Suspension Burning of Wet Woods & Other Fuels," ASME Annual Meeting, New York, December 1, 1952.

The products of combustion rise through the fresh bark in the evaporating zone. Evaporation of the moisture in the bark results in a low gas temperature entering the convection section of the boiler. Under these conditions it is very important to have low excess air, to minimize both the quantity of stack gas and its temperature.

Gas or Oil Burning

Gas or oil is introduced through tilting type burners above the level of the spreaders. Air ducts are split after leaving the preheater and are separately dampered so that air can be separately regulated and proportioned to gas and bark as required.

The Boiler

The boiler is of single pass design, with $2\frac{1}{2}$ in. tubes on $3\frac{1}{2}$ in. centers, the tubes being swaged to 2 in. where they enter the drums. Design pressure is 725 psig, operating pressure 590 psig at superheater outlet, operating temperature 750 F., with feedwater at 274 F. The furnace is fully water-walled. Soot hoppers are provided in front of and behind the mud drum. One retractable soot blower at the front of the first pass was installed after initial operation developed slagging at this point. Otherwise none are installed, but wall boxes are provided for their

Bark Fuel and Burning Methods

Wood arrives at the paper mill in the form of logs about 5 ft. 3 in. long and of varying diameters. These logs are fed to barking drums, which are large horizontal cylindrical revolving drums with perforated sides, and with various internal projections to tumble the logs and increase abrading action. Logs fed into the higher end of the revolving drum are carried up the side and fall back, gradually feeding to the lower end of the drum as bark is abraded from the logs.

When the logs finally leave the discharge end of the drum they are largely bark-free and move on to the next process.

The bark falls through the slots in the drum into a hopper from which it is removed by a conveyor. From 500 to 700 pounds of bark, containing from 30% to 50% moisture, are recovered per cord of wood fed to the drum.

Depending on the species of tree and the season, the size and tough-

ness of the pieces of bark vary greatly. At worst they are as long as the log, and from 4 in. to 6 in. wide, with the toughness of leather.

In the past the bark as it came from the drum was generally burned by either the pile or overfed grate method. In the pile method it was dumped through holes in the top of a dutch oven onto a flat stationary grate, where it built conical piles which burned on the surface. In the overfed grate method it was fed onto the steeply sloping top section of an undulating grate which gradually became less steep in its lower sections. The bark, moving from section to section, was burned as it traveled, the ash being discharged.

In recent years many installations have employed low-set spreader stokers to burn bark, first shredding the bark into small enough pieces to be handled by the spreader. The spreader principle is employed in the new installation described here.

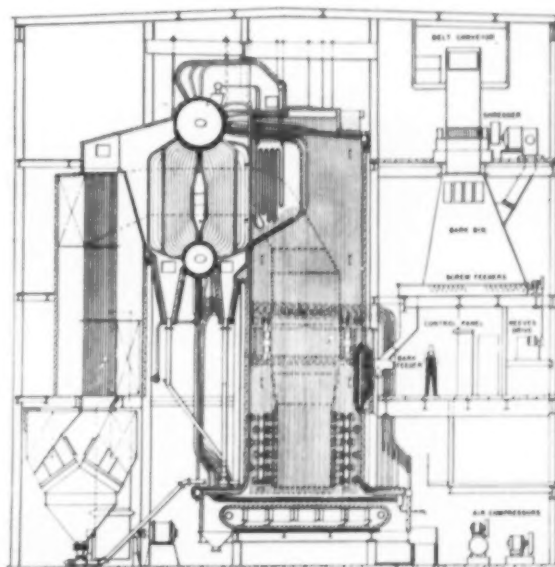
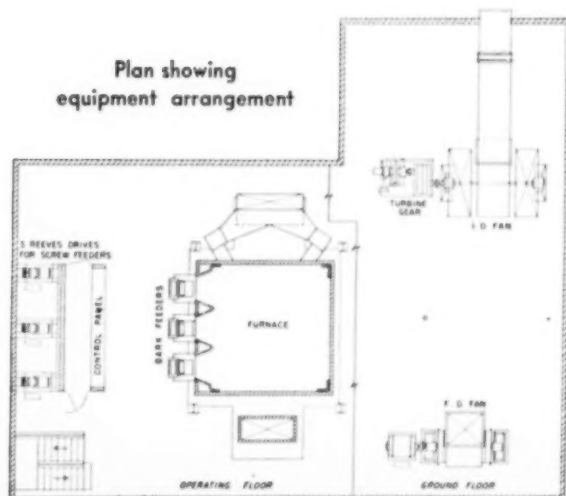
future installation if required. It is not expected that they will be needed unless and until substantial use of fuel oil is required.

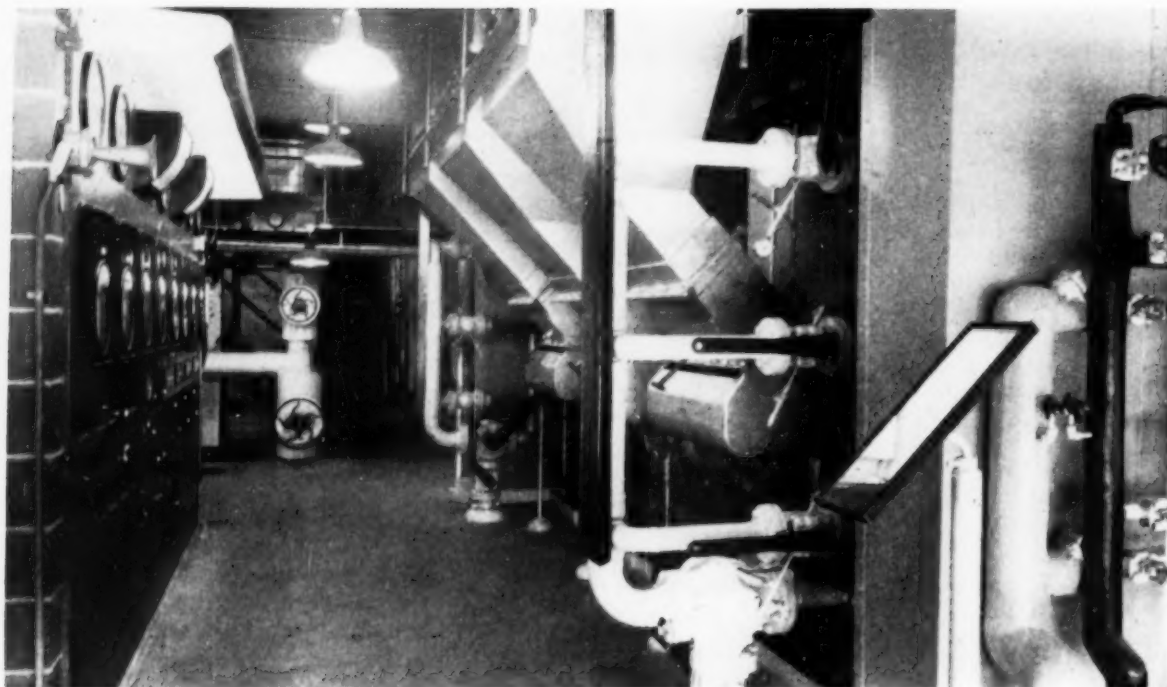
From the boiler the gas flows down through an air preheater to a Prat-Daniel dust collector which is split, the gas from each half going to its own side of the induced draft fan, which is at ground level to one side of the boiler. This

permits a very compact arrangement.

Ash from the dust collector and soot hoppers at the mud drum is reinjected just above the grate and below the turbulent zone, so that it is deposited at the back of the grate. With the low velocity air through the grate, the ash is carried forward on the grate, burning out enroute and finally being de-

Cross-section of boiler plant. ▶





View across front of boiler, with auxiliaries at left.

posited in the ash pit. The induced draft fan discharges through a breeching to the stack serving the old boilers.

Operation & Control

The new boiler will operate in parallel with both black liquor units and gas-fired power boilers. The steam output of the black liquor units is governed by the process. The power boilers are under full automatic control to maintain steam pressure. There-

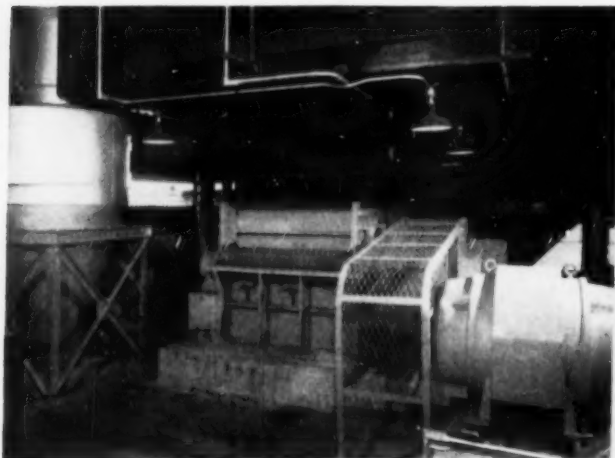
fore it was decided to base-load the new unit, but with provision for conversion to conventional pressure control.

A base load is set on the master, and the gas flow is proportioned to supplement the bark feed to maintain this base load, which must always be greater than the steam available from the maximum instantaneous bark feed. Air flow to the gas burners is metered, and proportioned to the gas flow. Total air flow is measured by the pres-

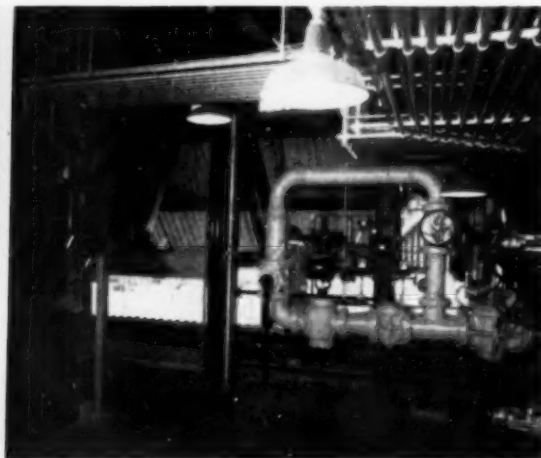
sure drop across the preheater and the forced draft fan inlet louvers are adjusted to give the total air required.

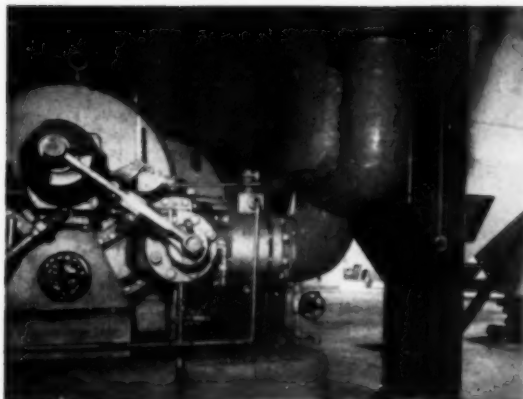
Since different amounts of air are required per pound steam made from bark and gas, the controls subtract the air to the gas burners from the total air, and adjust the total to proportion the balance to the bark feed. An oxygen recorder is included as a guide to the operators in making adjustments and as a check on control performance.

Shredders at center; bark bin dust system at left.



Control room left; gas control system at right.





Induced draft fan turbine.



Forced draft fan and dust hoppers.

Dampers controlling the supply of air to the stoker grates are pneumatically operated by hand control from the board, since air supply is based on observation of the grates, and distribution between stoker zones is by manually operated dampers. The speed of the turbine-driven induced draft fan is regulated to maintain furnace draft.

Controls and instrumentation are by Bailey Meter Company, who also

provide the 3-element feedwater control.

Performance

Predicted performance contemplates the generation of 2.45 pounds of steam per pound of 50% moisture bark, at 130,000 pounds per hour steam load. This represents an efficiency of 65.8%. Considering that the inherent loss due to moisture in the fuel is 22%, this is excellent performance. It is based

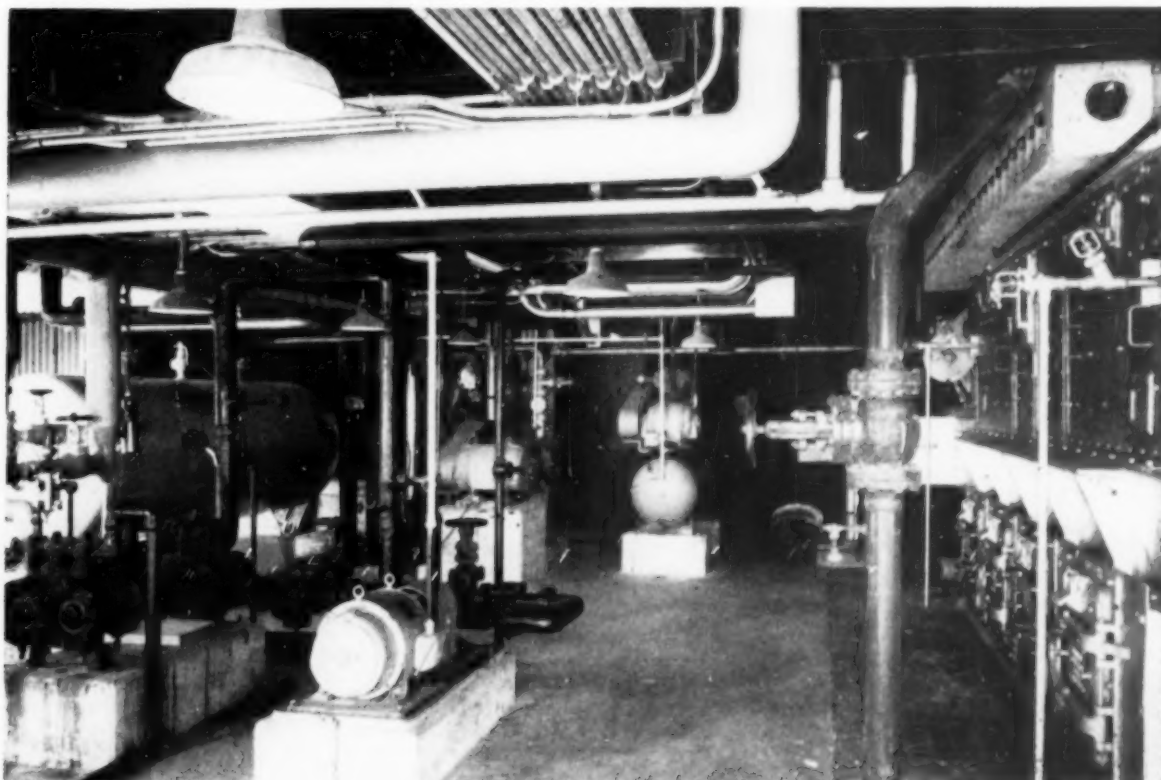
on 20% excess air and 445 F stack temperature. On gas, at 160,000 pound load, predicted efficiency is 80.4%, with 15% excess air and 422 F stack temperature. Predicted efficiency of the dust collector is 94%.

Bark Handling

The incoming bark is diverted from the chutes to the bins serving the old over-feed-grate bark-burn-

(Continued on page 91)

View across firing aisle, showing instrument and control panel and spreaders.



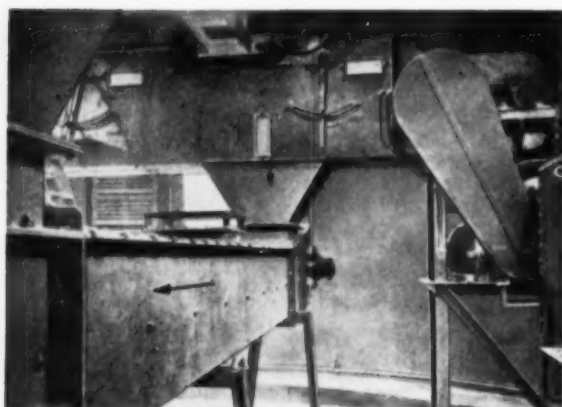
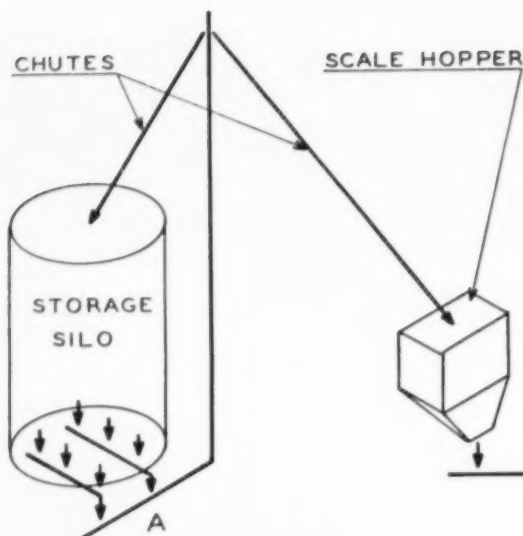


FIG. 1. INSTALLATION AT POINT A



FIG. 2 INSTALLATION AT POINT B

Mechanical Handling System Meets Rigid Process Demands

Cellulose acetate properties dictate type of equipment in Maryland plant of Celanese Corp.

By FRANCIS A. WESTBROOK

Photos courtesy Stephens-Adamson Mfg. Co.

AT ITS Amcelle Plant near Cumberland, Maryland, the Celanese Corporation of America has installed a comprehensive 12 ton per hour capacity mechanical handling system for cellulose acetate. The system is divided into two parts; one for discharging the material to a railroad siding for shipment and the other for processing in the plant.

The properties of cellulose acetate were an important factor in the selection of conveying equipment which should be used. The material as produced in this plant is in flake form and a certain amount of dust results from its handling. This makes it desirable to handle it in totally enclosed casings and to use explosion proof motors for the drives.

As it comes from the presses, cellulose acetate is slightly acid and therefore corrosive.

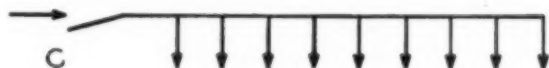
For that reason, the horizontal inclined conveying unit feeding the dryers has a stainless steel casing and drive chains. Product is non-corrosive following the drying operation. Since it weighs only 12 lb per cu ft, relatively lightweight handling equipment is entirely satisfactory.

The Redler conveying units (Stephens-Adamson Mfg. Co.) meet these process requirements and are used extensively at the Amcelle plant. The totally enclosed casings of the Redler conveyors preclude dusting, except around open discharges. However, these are protected with canvas sleeves. In several instances, the cellulose acetate is moved horizontally and then vertically by a single unit, affording flexibility and simplicity.

For plant processing there are five steel stor-



FIG. 3 INSTALLATION AT POINT C



age tanks 30 ft in diameter and about 75 ft high. Each tank has a conveying system arranged as shown in the sketch.

Under each storage bin there are two 24" conveyors feeding from three openings and handling 6 tons per hour each. (See photo and sketch at installational point A).

These discharge into an L-type 13" Redler conveyor, which has a capacity of 12 tons per hour and travels at 66 fpm. This conveyor has a horizontal run of approximately 25 ft and a vertical rise of 97 ft to a point from which it discharges by chute into a scale hopper. It is powered by a 7½ hp explosion proof motor. There is also another chute to the storage silo so that any surplus in excess of that needed at the scale hopper can be returned.

From the scale hopper, which is equipped with a Toledo dial scale, there is a series of three 13" horizontal conveyors totalling about 290 ft in length. These have a capacity of 20 tons per hour and travel at 80 fpm. There are fourteen rack and pinion discharge gates in this conveyor line. Note (at installation point B) that floor area is clear since light, Redler casings are suspended from ceiling channels.

The conveyor line associated with another of the storage tanks consists of two sections totalling about 216 ft with ten discharge gates. The third conveyor line is in three sections, totalling about 238 ft in length with twelve discharge gates. Each conveyor section of each line is driven by a 10 hp explosion proof motor.



FIG. 4. As it comes from the presses, cellulose acetate is slightly corrosive. For that reason, this horizontal-inclined unit feeding the dryers has a stainless steel casing. Elevator feeds 7" Redler at rate of 1½ tons per hour. Material weighing 15 lb per cu ft moves up 12 ft slope to dryers.

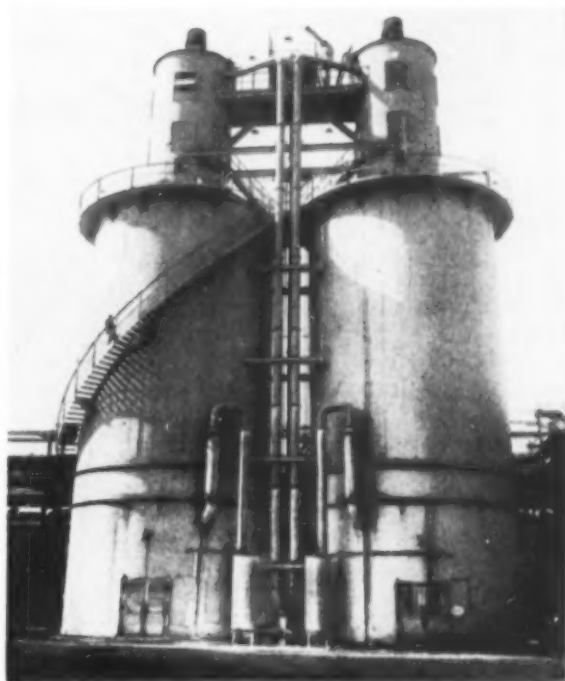


FIG. 5 These steel storage tanks, 30 ft in diameter and 75 ft high, are used for material storage.

All of the discharge gates are equipped with pivoting chutes which can be made to swing over manholes in the floor (See photo and sketch at installational point C). Canvas sleeves are provided at the ends of the discharge chutes, which extend into the manholes to prevent dusting as the material flows into the mixers on the floor below.



Construction highlight report . .

Expansion Program Completed at Southern Paperboard—Georgia

A TWO-YEAR \$5 million extension program has been completed at the Southern Paperboard Corporation, Port Wentworth, Georgia. The Georgia kraft container board mill is a subsidiary of the Robert Gair Company, Inc., New York, manufacturers of paperboard, folding cartons and shipping containers.

When completed in June 1948 at a cost of nearly \$17 million, the mill included the most up-to-date methods and equipment available at that time. Yet four years later, in order to take advantage of advanced techniques and to make other improvements, the extension program was authorized.

This \$5 million addition to the chemical and mechanical facilities has been completed with a minimum loss of operating time. Daily capacity has been increased to a maximum of 685 tons of finished paperboard. Operations to date show improved quality with an important reduction in the amount

of pulp wood used per ton of paperboard. Modernization highlights include the following:

Power plant—To provide the additional steam required for the mill expansion a new 160,000 lb/hr Combustion Engineering boiler was added. This unit is equipped for either oil or gas firing, with provision for conversion to pulverized coal in the future.

Auxiliary boiler room equipment added to complete the boiler room expansion consisted of a boiler feed pump, makeup pumps, feedwater heater, chemical feed pump, combustion and feedwater controls.

To provide for the additional power required by the mill expansion, a new General Electric 10,000 kw maximum capability turbo-generator was installed in the turbine room. This is a double automatic extraction, condensing machine equipped with a Westinghouse Corporation condenser and auxiliaries.

In addition, the existing West-

inghouse turbo-generators were altered so that the non-condensing turbine exhausts at and the condensing turbine extracts at 80 psig instead of the previous 50 psig. At the same time the condensing Westinghouse turbine was altered to increase its maximum capacity from 6000 to 7500 kw.

Causticizing — To supplement the existing Dorr Causticizing Plant, a new lime storage bin was installed, this to be fed from a Jeffrey lime track unloading hopper, drag conveyor, and bucket elevator.

A new No. 10 Dorr lime slaker, with new and reburned lime feeders, was provided outdoors adjacent to the present slaker building.

An additional lime mud storage tank with agitator and a white liquor storage tank were found necessary.

Digesters—A 29 ft by 76 ft extension was added to the digester building to house four new 3320 cu ft carbon steel Chicago Bridge & Iron Company digesters, each equipped with a gas-off separator and Paul hydraulically controlled blow valve.

For feeding chips to the four new and the six old digesters, a new shuttle belt conveyor centered over the digesters and hung from overhead tracks was in-

Principal Contractors and Suppliers

CONTRACTORS FOR MILL CONSTRUCTION—Brooks Fisher Insulating Co., piping insulating; Byck Electric Co., Inc., electrical installation; Byck-Worrell Constr. Co., site preparation; Clausen-Taylor Marine Const. Co., temporary building; Daniel Construction Co., building contractor; Grinnell Company, Inc., Hall Steel Co., reinforcing steel; Ledbetter Erection Co., equipment erection; North Brothers, equipment insulation & protective coating; O'Neal Steel Works Co., structural steel; Raymond Concrete Pile Co., piling.

SUPPLIERS OF MILL EQUIPMENT—Allis-Chalmers Mfg. Co., pumps; American Blower Corp., oil coolers and couplings; Chemical Linings, Inc., tile chests; Chicago Bridge & Iron Company, tanks and digesters; Clark & Vicario, instruments and controllers for vapor circulating system; R. D. Cole Mfg. Company, misc. tanks; Combustion Engineering, Inc., power boiler; De Zurik Shower Co., consistency regulators; Dorr Company, causticizing equipment; The Emerson Mfg. Co., pre-breakers.

Equitable Equipment Co., misc. tanks & chutes; Eriex Mfg. Co., magnetic separators; Foxboro Company, instruments; General American Transportation Corp., evaporators; General Electric Co., motors & turbo-generator; Goulds Pumps, Inc., pumps; Greenville Steel & Foundry Co., valves; Griscom-Russell Co., closed feedwater heater; Holt Equipment Corp., American Chain & Cable Co., crane; Improved Machinery, Inc., repulper conveyor, high density

storage agitator & equipment, poppet valves, centrifugal screens, agitators; Ingersoll-Rand Company, pumps.

Jamar-Olmen Co., paper machine hood exhaust; Jeffrey Mfg. Co., lime conveying and auxiliary equipment; Koppers Corp., couplings; Link-Belt Company, belt conveyors, soap skimmer; Midwest-Fulton Mch. Co., vapor circulating system; Milton Roy Company, chemical pump; B. L. Montague Company, shuttle chip conveyor; Samuel Moore & Company, copper tubing; Nash Engineering Co., vacuum pumps; Oliver United Filters, Inc., brown stock washers, foambreakers, savealls; O'Neal Steel Works Co., supports.

Paul Valve Corp., blow valves; Powers Regulator Co., steam regulator; Republic Flow Meters Co., feedwater regulator & control system; John D. Robinson Co., New York rubber conveyor belting; J. O. Ross Engineering Corp., washer hood & exh.; Savannah Iron & Wire Works, misc. steel; Spotswood Parker Co., boiler flame control; Sprout-Waldron & Co., refiners & rej. drainer; Viking Pump Co., soap pump; Westinghouse Electric Corp., motor controls, surface condenser, and hot well pumps; Worthington Corp., pumps.

EXPANSION PROGRAM—Directed by C. S. Huestis, vice-president of Southern Paperboard Corporation, in conjunction with the mill staff headed by Charles McCarthy, vice-president, and assisted by Claude Adams, production manager and Bruce Ellen, power and pulp mill superintendent. The J. E. Sirrine Company of Greenville, S. C., were retained as engineers for the complete detailed design and supervision of construction.

stalled by the Montague Machine Company. The shuttle belt was fed from the old chip conveyor.

A new black liquor measuring tank was added for supplying charges of black liquor to both the new and old digesters.

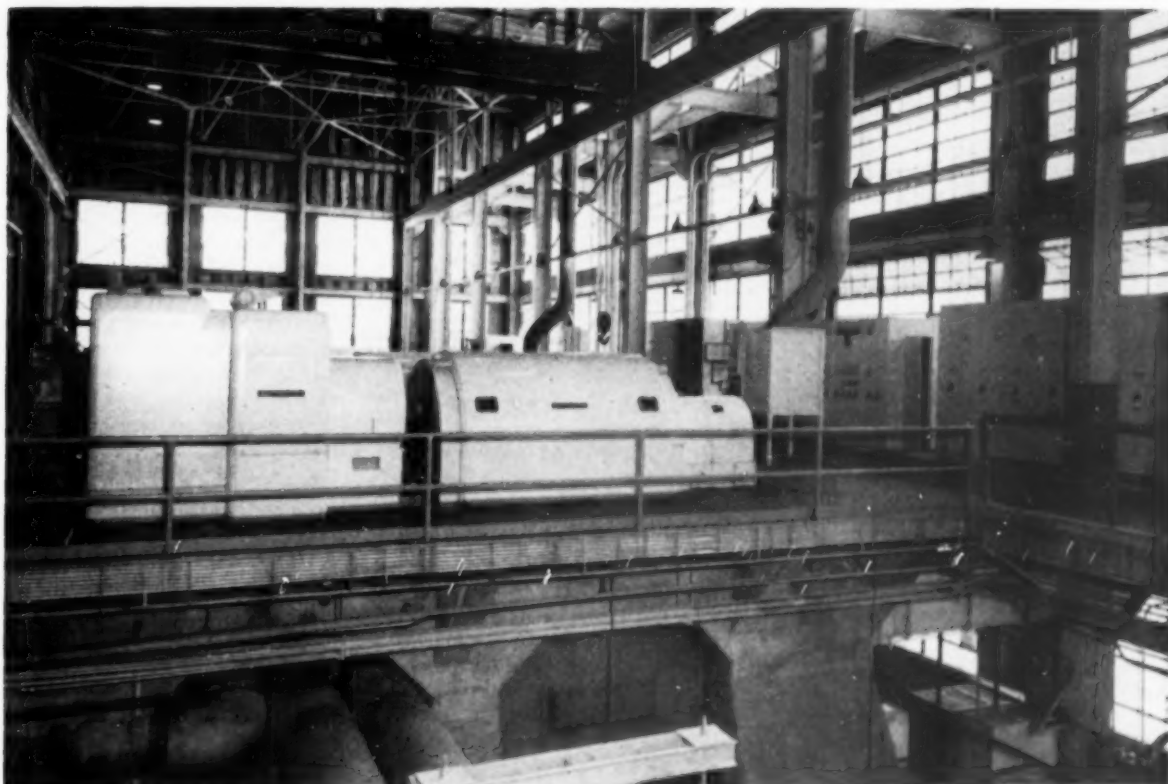
Piping changes in the blow lines were rearranged so that the old digesters could be connected to one of the existing blow tanks, and the new digesters to the other present blow tank.

Washing and screening — To

house the additional washers, screens, deckers, and the refining equipment, the existing wash and screen room was extended for a width of 57 ft; the length of the

(Continued on page 72)

EXPANSION included a new 160,000 lb/hr Combustion Engineering boiler; a new General Electric 10,000 kw turbo-generator; and alterations in existing Westinghouse turbo-generators.



Hoisting Equipment

Texlite in Dallas, Texas, reports on Its Preventive Maintenance Program

By **FRED C. CRANE**

Chief Industrial Engineer
Texlite, Inc., Dallas, Texas

Bridge cranes and several electric and chain hoists are extensively used in the receiving, manufacturing and shipping departments of this metalworking plant.

AT Texlite, Inc., in Dallas, Texas, hoisting equipment is used from the time sheet steel is unloaded from the railroad car until the crated product is loaded for shipment. Texlite is one of the Southwest's largest manufacturers of porcelain enameled products.

Equipment being used consists of a three ton Cleveland Tramrail bridge crane installation, several one ton electric and chain hoists, and a special bridge unit for use in salt bath heat treating which was built by Texlite. Load bars, sheet grabs, and cable slings are used for applying the hoisting force to the units being handled.

The need for an adequate preventive maintenance program on hoisting equipment is obvious. Usually a defective hoisting unit means a serious accident. A failure of a piece of hoisting equipment generally is more serious than other machine failures due to the nature of the work being performed. In most cases hoisting equipment fails under load which increases possible damage.

At Texlite, we realized the importance of preventive maintenance on our hoisting equipment, but because of the press of other important work, this phase of our

operation was neglected until an accident, due to cable failure, reminded us of the need for such a program.

We immediately set up a procedure of regular inspection and report on all hoisting equipment and attachments. The forms used were devised with several thoughts in mind.

1. The system must be simple.
2. The form must completely identify the piece of equipment being inspected.
3. The form must identify the person who actually performs the inspection.
4. Reminder of periodic inspection must be automatic.
5. The inspection must be performed to a check list.
6. The inspector must be able to indicate the condition of the equipment on the form.
7. The repair work done must be itemized on the form.
8. A follow-up must be maintained to be sure that the required inspections are made within a reasonably short time after they are scheduled.

How System Works

We divided the equipment to be covered by this program into sev-

eral classifications: chain hoists, electric hoists, wire rope slings, and load bars. This was done to reduce the number of different master inspection forms needed.

An inspection check list was prepared for each classification, and the master form for each classification made. The forms include spaces for basic information such as equipment number, type of equipment, manufacturer, serial number, etc. They also include information such as date of issue, date of inspection, and name of the person doing the inspecting.

The need for an inspection on a certain piece of equipment is automatically brought to our attention by means of a tickler file by date. Cards containing necessary information on equipment needing inspection along with pertinent report forms are given to a typist to be filled out. The forms are then sent to the Maintenance Department and are assigned to the person who will perform the inspection.

The inspector performs the check operations indicated, notes that the



HOISTING EQUIPMENT Preventive Maintenance Inspection Check List

(Inspections monthly unless otherwise indicated)

WIRE ROPE SLINGS (Textile)

1. Check all attach fittings for any sign of overload or weakness such as bending, cracking, etc.
2. Check hooks for signs of improper loading resulting in spread throat or stretched, cracked or worn eyes.
3. Check condition of splices and clamps.
4. Check cables for signs of abuse or wear.
 - a. Is there evidence of corrosion, kinks or wear?
 - b. Are there any broken wires on the outside or crown of the rope strands?
5. Lubricate cable making sure lubricant works into strands.

LOAD BAR OR LIFT FRAME (Textile)

1. Check all attach fittings such as bolts, clevises, etc., for signs of overload or weakness such as bending, cracking, etc.
2. Check all structural parts for signs of bending, cracking, etc.
3. Make sure all necessary loose fittings such as bolts and pins are in place and are not bent, cracked or otherwise damaged, and have safety chains attached.
4. Check cables (if any) for signs of abuse or wear.
 - a. What is condition of splices and clamps?
 - b. Is there any evidence of corrosion, kinks, or wear?
 - c. Are there any broken wires on the outside, or crown of the rope strands?
 - d. Lubricate cable making sure lubricant works into strands.
5. Check condition of protective pads (if any) replacing those which because of damage or wear might damage the work being handled.

ELECTRIC HOISTS (Yale & Towne)

1. Check the load cable for signs of abuse or wear.
 - a. Is there evidence of corrosion, kinks or wear?
 - b. Are there any broken wires on the outside or crown of rope strands?
2. Check sheaves and drum for roughness, scoring and wear which will damage the cables.
3. Check bearings for wear which would cause sheave or drum to wobble or run out of true alignment.
4. Inspect load hook and its fastening to the cable. Check for signs of loading at point rather than middle.
5. Check motor brake for correct adjustment.
6. Check load brake for any irregularity of operation or drifting at full load. Repair at once if needed.
7. Lubricate all parts intended to be lubricated. Keep lubricant out of electrical parts.
8. Lubricate load cable making sure lubricant works into strands.
9. Be sure breathing holes on oil cases are not plugged.

10. Check casing and all air circulating passages for cleanliness. Blow out or clean if necessary.
11. Inspect wheels for sign of wear, track for levelness and for true joints.
12. Operate hoist under no load, raising, lowering, traveling, reversing by limit switch, etc. Listen for noise indicating loose or worn parts. Check and tighten any loose bolts, screws, parts, etc.

CHAIN HOISTS (Robbins & Myers)

1. Check top and bottom hooks. Determine if nuts and shackles attaching them to hoist and chains are secure; then determine if hook has been stretched.
 - a. Hooks excessively worn or stretched should be replaced.
2. Check pockets of load sheave for excessive wear, note if load chain engages properly.
 - a. Load sheave should be reversed when one end of pockets is worn, and replaced when both ends of pockets are worn. Never use stretched or worn chain in new load sheave pockets.
3. Check brake by operating hoist with and without load. See if brake holds at all positions.
 - a. Repair or replace if any uneven action or any drift is noted.
4. Lubricate all parts intended to be lubricated.
 - a. Do not overlubricate or lubricate wrong parts.
5. After lubricating, operate all parts rapidly under full load and under no load. Listen carefully for noises which may indicate worn gears, sheaves, sprockets, bearings, or looseness of any parts.
6. When lubricating clean the outside of the case thoroughly and look for signs of oil leakage indicating faulty bearings or shields, or spillage indicating that too much lubricant has been used.
7. Lubricate load chain making sure lubricant gets into the contact points of the links.
8. Inspect load chain for damaged links.
 - a. If any damaged links are found, have section of chain replaced, preferably by hoist manufacturers.
9. Inspect, lubricate and maintain all overhead parts such as trolleys and wheels.

Following are quarterly inspection checks:

1. Check operation of load brake pawl, see if it engages with ratchet properly. Check spring and pawl stud. See if they are secure and not appreciably worn.
 - a. Brake assembly washers, pawl and pawl springs should be replaced if worn excessively or damaged.
2. Remove hand chain wheel and see if leather and galvanized discs show excessive wear, also check disc hub and ratchet disc for wear.
3. Check internal gear, gear and pinion. See if teeth show excessive wear, or if any have broken off.
4. Measure load chain length. If chain has stretched as much as 3%, replace the chain.

operation has been checked, and in the space provided on the form indicates conditions needing attention. When the form is returned to the Maintenance Department, the foreman checks to see what repairs are necessary, and arranges to have this work done. This is noted on the form. The form is then returned to the Industrial Engineering Department and filed in the proper equipment file folder.

In order to be sure that the required inspections are made within a reasonably short time after they are scheduled, the card used by the typist in originating the request for inspection is held in a suspense file by advance date. If the completed inspection form has not been returned to Industrial Engineering by the date the card shows up in

the suspense file, a follow-up is made to expedite that particular inspection.

We find that by using the check list type of form, the inspector will be sure to check each important item on every inspection, not slighting any. It also saves the inspector's time because he knows exactly what is to be inspected on each piece of equipment.

Multiple Benefits

The benefits which have accrued to Textile from using this system are intangible. We know from our records that a number of repairs have been made to our equipment which, if neglected, could have caused accidents. We are able to use our equipment with the knowledge that it is in good condition.

It is also felt that the installation of this system has helped in eliminating the feeling that the Maintenance Department is just a "repair" department.

The results we have obtained from this system have proved to be so beneficial that we are now expanding this system to cover all vital equipment in the plant. A vital piece of equipment is defined as one whose breakdown would cause a shut down of the production facilities. As soon as this vital equipment has been covered, we are planning to extend this system to cover all of our major pieces of equipment and facilities. When this has been done, we believe that we will have an excellent preventive maintenance program at Textile.

Versatile and Flexible TRANSFORMERS

ELECTRIC transformers, as ordinarily used, are devices to step up or step down voltages. They are very rugged and efficient as usually they have no moving parts and consist of coils of wire, iron laminations, insulation, containers and terminals.

In a transformer an alternating electric current is sent through a coil of wire. There is a magnetic field or lines of force set up by the current flowing in the turns of wire in the coil. The coil is set in such a position that the lines of force pass through iron which is thus magnetized. Now if a second coil is placed so that it is in the induced field in the iron an electromotive force or voltage will be induced in the second coil. The two coils are not in physical contact but the invisible lines of force cut through the second coil as well as through the iron. As voltage is the time rate of cutting lines of force the voltage of the second coil will depend upon the strength of the field, the number of turns of wire in the coils and the cycles or alterations per second of the impressed voltage on the first coil. The ratio of voltages in the two coils will be approximately the ratio of the turns in the two coils.

Power Plants and Transmission

One use of transformers is in a generating plant. The voltage generated in the generators will be relatively low and may not be suitable for the transmission of the energy to the load, depending on the distance the energy has to be transmitted. Thus, if the plant is isolated and the transmission distance is long it is necessary to step up the voltage in order that

By **VICTOR N. FRIEDMAN**

Electrical Engineer
National Lead Co.
St. Louis, Mo.

the transmission line can carry more energy than it could at a lower voltage as the current will vary inversely with the voltage. It is not practical to generate a high voltage in the generators, one reason being the excessive insulation required. Thus the generators and the station transformers combine to form a team that permits long transmission distances involving large amounts of power.

On the receiving end of the high voltage transmission line the same problem is present in reverse. The high transmission voltage cannot be used in the equipment comprising the load. Thus step down transformers are used to obtain the lower voltages. Also, of course, the transmission voltage may be reduced for distribution of the power over a given area and again reduced to obtain the required equipment voltage.

General Example

To explain the above conditions assume generation is at 13,800 volts. That voltage, for transmission purposes is increased to, say, 110,000 volts. At the distribution point the voltage is stepped down to 2,300, 4,500, 13,800 or 34,500 volts and, later, again stepped down to 120, 208, 220 or 440 volts. Also at the final point various voltages and phases may be obtained with transformers such as 120/240 volts, three wire, single phase; 120/208 volts, four wire, single phase and three phase; 220

volts single and three phase or 440 volts single and three phase.

In motor starting equipment the transformer is a very useful device. Throwing a motor directly on the line may have serious and harmful results. Suppose we are installing a 50 hp, 440 volt, three phase motor. Assume the capacity of the system is limited and the line surges in throwing this motor directly on the line. This is very detrimental and in the case of purchased power may be prohibited by the power company. To connect that motor directly on the line in starting will cause a sudden flow of not the name-plate rating of some 60 amperes but possibly seven or eight times that amount. The instant the switch or circuit breaker is closed the high current flows until the motor builds up a counter-electromotive force. This surge of current causes flickering of lights connected to the same system at nearby points and pulls down the voltage. This lowering of the voltage may be so great that devices with low-voltage protection coils may drop out thus interrupting service of other units on the system. At any rate, a surge is set up that is detrimental to normal operations unless the capacity of the system is large.

In order to overcome the large flow of current, transformers may be used to decrease the initial starting voltage. An auto-transformer is a single winding on iron laminations. The entire winding is across the full voltage of the system which is 440 volts under the conditions we are here assuming. The single winding has taps at various points to give reduced voltages. If a tap is, say 80%, then 80% of 440 volts will be connected to the motor in starting. Then the starting current is reduced and the detrimental effects of the surge current are reduced as the current is reduced, not directly as the applied voltage but as the square of the applied voltage, in this case 64% of the full voltage starting current will flow.

In the usual three phase auto-transformer starter either two individual coils or windings are

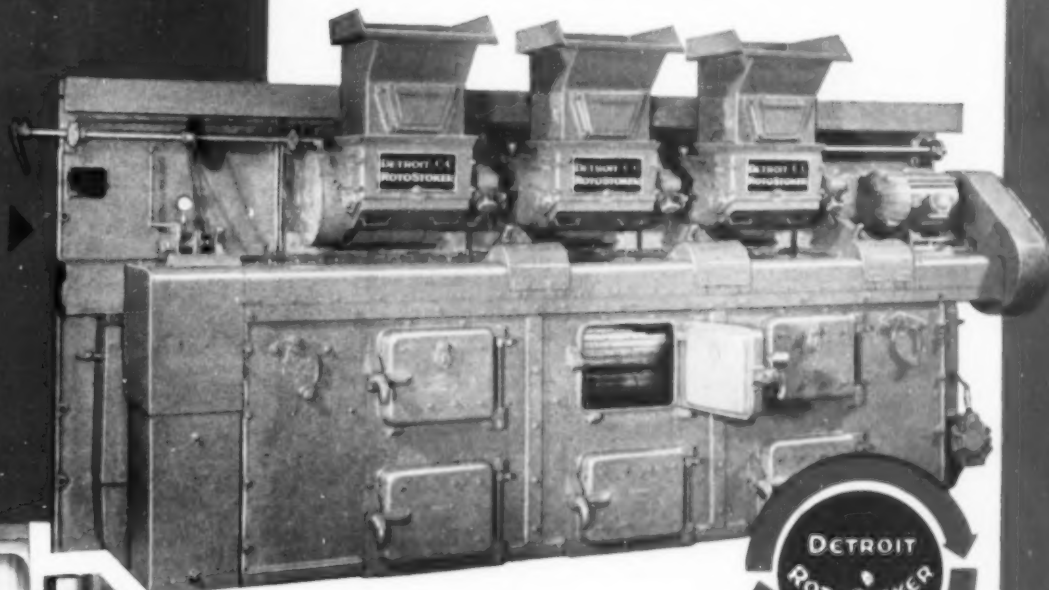
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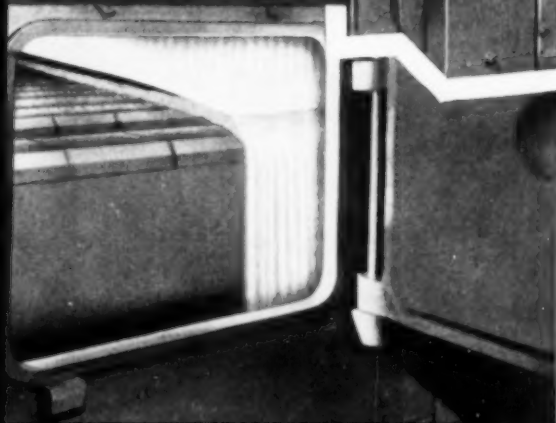
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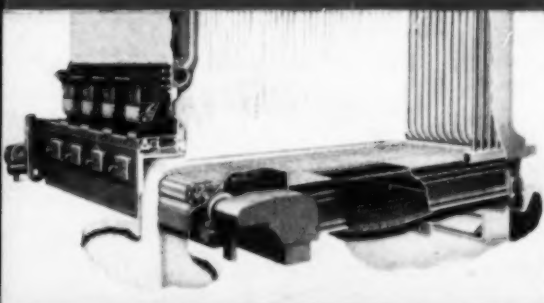
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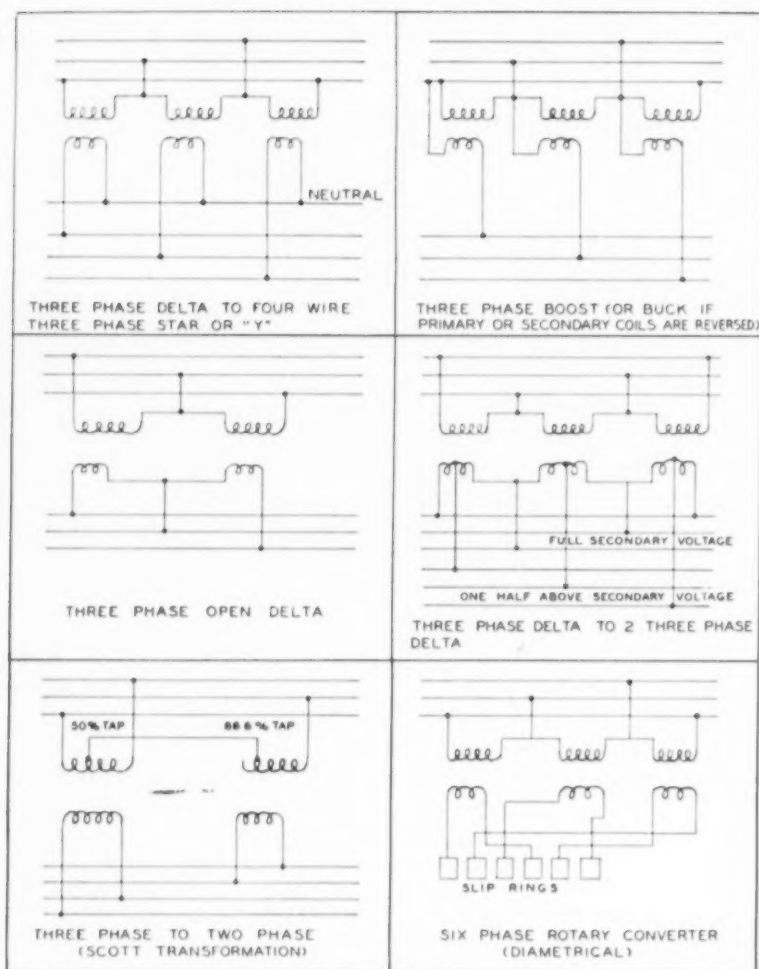
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Versatile and Flexible Transformers (continued)



Some standard transformer connections that may aid the electrician.

used on open delta or three windings may be used, one in each phase. It should be noted that the starting torque of the motor is reduced as the square of the applied voltage. In the case we are assuming the motor starting torque will be reduced, not to 80% of the full load motor torque but to $.80 \times .80$ or 64% of that full load torque. If the starting torque required is very great the resultant torque may not be sufficient to start the load and bring the motor up to normal speed. Thus a higher tap may be required or a different method.

Another transformer arrangement is also possible in that the motor may be initially connected to a delta connection and after

its speed has sufficiently increased it is connected to a Y or star connection. The ratio of voltages from delta to star is 1.732 so the initial voltage impressed on the motor is 440 divided by 1.732 or about 254 volts or 58% of normal.

Auto-Transformer Uses

An auto-transformer may be used to obtain a lower voltage for a particular use but care should be used because the voltage to ground on the single winding may be the full impressed voltage. Thus if an auto-transformer is connected across a 440 volt line and has a one-quarter tap the voltage from one end of the winding is 110 volts while the voltage is 330 volts from the other end of

the winding to the same tap. A load of 110 volt rating may be supplied from the tap and the proper end of the winding but in case of an accidental ground the voltage on the 110 volt circuit could be 440 volts to ground. So the safety angle must be considered as well as the cost of the auto-transformer which is less than that of a two winding transformer.

Instruments and Meters

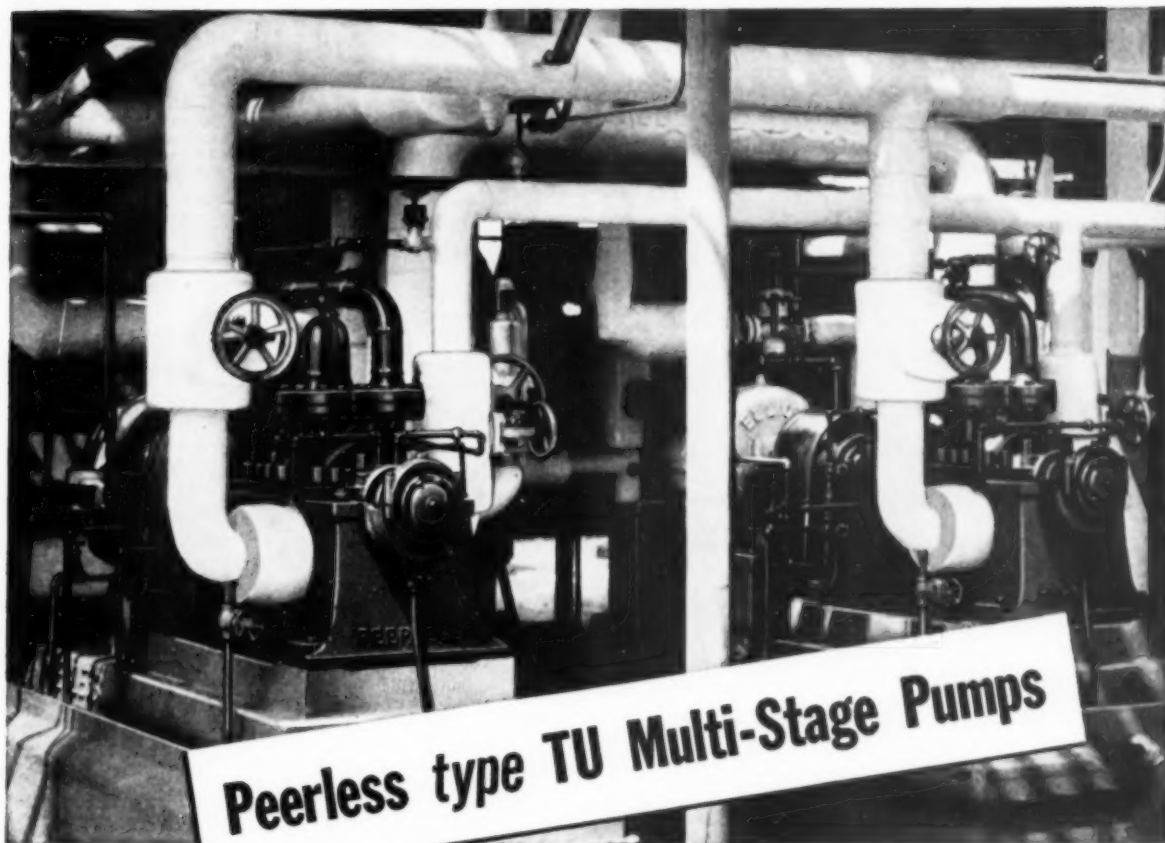
Transformers are used with instruments and meters to obtain various values of a high voltage circuit. It would not be safe to connect, say, a voltmeter directly to a high voltage circuit. Neither would it be economical because the voltmeter would have to be insulated for the high voltage and thus would be very expensive and large in size due to the insulation required. In such a case a potential transformer is used. This transformer is basically the same as a power or distribution transformer as far as principle is concerned but it usually is of the dry type.

Potential Transformers

The primary winding in the potential transformer is designed for the high voltage to which it is connected while the low voltage or secondary winding is designed for a standard voltage such as 115 volts. A transformer of this type is of small capacity such as 50 to 200 volt-amperes but may be used to energize numerous meters, instruments and operating coils. Thus a voltmeter would actually read the secondary voltage but the scale would be calibrated in terms of the high voltage, that is, 115 volts multiplied by the ratio of the transformer. In a watt-hour meter installation the meter would operate on 115 volts on the potential coils but the dial gearing or the dial constant would be such as to record in primary values of the voltage and the current.

Current Transformers

A current transformer is really a step up voltage transformer. That is, there may be no more than one turn in the primary and



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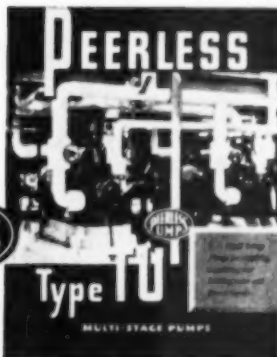
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a number of turns in the secondary. Thus the voltage is stepped up but the current is stepped down, usually to 5 amperes. The voltage stepped up in the case of the current transformer is not the line voltage but the voltage across the current transformer which is the voltage drop due to its impedance. The voltage in the secondary is normally very low in the current transformer and the secondary may be short-circuited without damage.

A current transformer secondary should never be opened as a high voltage will be developed in that secondary. The resultant high voltage would be a hazard to anyone touching the transformer or the open circuit and could also damage insulation of the transformer. This is because, with an open secondary circuit and current flowing in the primary circuit there is no opposing magnetomotive force and thus the magnetic field may rise to a large value. All the turns in the secondary coil are then cut by the excessively high field and induce a very high voltage in that secondary. The secondary of the current transformer is used as the source of current for instruments, meters and coils of various types.

As in the case of the potential transformers scale constants or gearing ratios are used to obtain the proper values. Also, two transformers are usually used in three phase circuits, the transformers of each type being connected in open delta in the secondaries.

Open Delta Connections

Two single phase transformers may be connected to a three phase circuit to obtain another three phase circuit. This is called open-delta. The two transformers are connected exactly as they would be in a three phase delta, but, of course, the third transformer is missing. With this arrangement each transformer is loaded to its capacity in amperes at 86.6% of its normal rating. This is due to the phase angle involved. The two transformers as a bank are only equal in capacity to 57.7% of the rating of three similar

(Continued on page 72)

Standard Transformer Name Plate Markings

THE voltage ratings of transformers, due to their construction, vary in possible combinations that may be obtained or applied. It is standard for manufacturers to use three symbols on the transformer name plates, namely, a dash (—), a slant (/) and an "X" together with the voltages involved.

The Dash (—) Marking

The dash (—) is used to indicate the voltage ratings of separate windings in the transformer. For example, transformers of single phase construction may have a name plate reading 2400-240 volts. This indicates the transformer is to be used on a 2400 volt, two wire, high voltage circuit and a 240 volt, two wire, low voltage circuit.

The Slant (/) Marking

The slant (/), is used to indicate the voltages that may be obtained or applied from or to the same winding by different connections either internally on a terminal board or externally with leads brought out of the transformer. Thus a name plate may show 2400/4160Y-240 volts indicating the high voltage may be connected to a 2400 volt, two wire circuit or to a 4160 volt circuit with the connections made to one phase wire and the neutral of a 4160 volt three phase star or "Y" circuit. The low voltage, in this case, is the same as before, namely 240 volts, two wire.

A transformer of this marking may also be used as one of three similar transformers with their high voltage connections in delta on a three phase 2400 volt three wire circuit or in Y, (or star), on a three phase 4160 volt circuit, in either case the low voltage being 240. The marking of 4160 volts also indicates the transformer is insulated for that voltage. If the transformer were marked 4160Y/2400-240 volts it is of three phase construction for Y or star connection only on 4160 volts but with a neutral brought out and a voltage of 2400 volts from the neutral to any primary phase lead.

In the same manner 208/120 volts denotes a three phase 208 volt three wire circuit with 120 volts from the neutral to any phase lead.

Ground Marking

A marking of 4160GRDY/2400 means a single phase transformer that can be connected to a 4160 volt three phase Y circuit with grounded neutral.

The transformer has one insulated

terminal and one with reduced insulation for connection to the grounded neutral of the system or one terminal may be grounded to the transformer tank. The above marking in a three phase transformer indicates a three phase 4160 volt transformer with a reduced voltage neutral brought out.

Marking for Series or Parallel Connections

The slant (/) is also used to indicate different possible voltages obtainable or applied in series and parallel. Thus a transformer secondary marked 120/240 volts indicates the secondary may be connected for three different arrangements: for 120 volts, two wire full kva capacity with the two secondary halves of the winding in parallel; for 240 volts, two wire, full kva capacity with the two halves in series; and for three wire, full capacity in kva with the two halves in series and the two voltages available at the same time.

Mid-Point Tap in Winding

The slant (/) is also used to designate another arrangement. Thus 240/120 indicates a winding with a mid-point tap. This winding is 240 volts two wire full kva capacity and also 120 volts two wire but with one-half kva capacity. In the latter case the load is connected between one end lead of the winding and the mid-point of that winding.

Notice that the higher voltage is written first rather than last, as in the series-parallel marking.

Name Plate Marking Other Than Three Wire

The "X" on a transformer nameplate shows that the halves of a winding may be connected for either voltage named but not for three wire. Thus a marking of 2400x4800-240 volts indicates the high voltage winding may be connected with its halves in parallel on 2400 volts or in series on 4800 volts but not three wire. The secondary in this case is again 240 volts, two wire. A marking of 240x480 volts thus indicates the halves of the winding may be connected in parallel for full kva. capacity at 240 volts or in series at 480 volts, full capacity kva. but not three wire (240/480).

The three symbols discussed have been standardized by the National Electrical Manufacturers Association and the American Standards Association.



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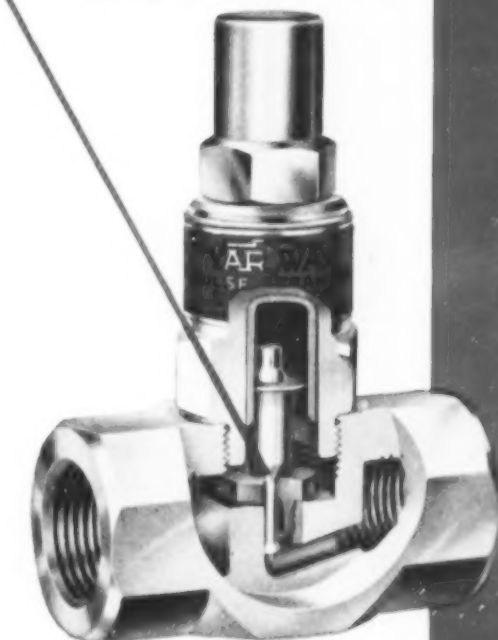
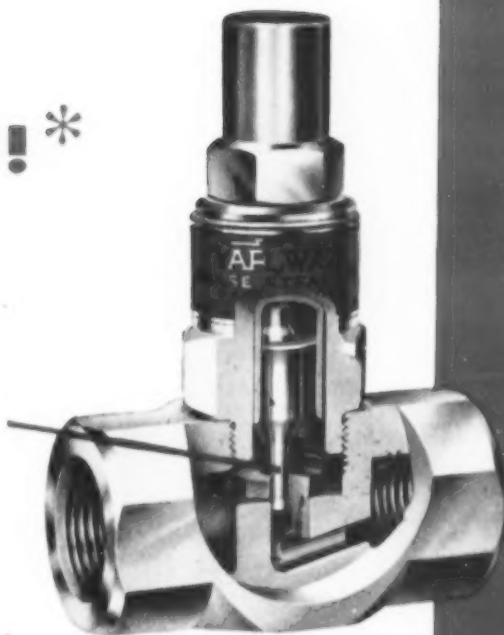
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Versatile and Flexible Transformers (continued)

transformers in the conventional delta. The voltage regulation with the open-delta is not as good as with the closed delta but the impedance of each transformer does not have to be the same. With three transformers in closed delta the impedances of the three transformers should be the same to avoid circulating currents.

Voltage Regulation

Transformers may be used to raise or lower the voltage of a circuit by connecting them to boost or buck. Suppose the voltage at the end of a 2400 volt line is but 2000. If the primary leads of 2400-240 volt transformers are connected across the 2000 volt lines and the secondaries in series with the 2000 volt lines and the primary leads of the transformers, the voltages will be boosted or lowered by about 10% depending on the polarity of the induced voltages in the secondaries of the transformers as determined by the connections of the primaries and secondaries. A reversal of the connections of either windings will cause a reverse effect. Care should be used in such transformer use in that the secondaries are connected directly in the primary or high voltage circuit. Also no fuses or cutouts should be used with these transformers because they are similar to current transformers in this arrangement and if the primary windings are open-circuited the counter-electromotive force is removed and the magnetic flux in the transformer cores or iron rises to a high value thus increasing the induced voltages in the open circuited windings. The resultant voltages may be several times normal.

Constant Current or Voltage

Transformers of special construction are used for constant current and also for constant voltage. If the secondary winding of a transformer is rotated with respect to the primary winding its induced voltage will change with the angle. By con-

trolling the position of the movable winding the desired result is obtained. Street lighting circuits in which a constant current of 6.6 amperes is desired is an example of the use of constant current transformers.

Special Connections

Sometimes it is desirable to obtain two different voltages from a three phase bank of transformers at the same time. Thus, if the secondaries of three single phase transformers are rated 120/240 volts, the outer leads may be connected in a three phase delta and the mid-points also connected in a delta so that there are two deltas, one of 240 volts and one of 120 volts. The impedances of these transformers must be low or the lower voltages will not be equal. However, if the secondary windings are interlaced in the transformers so the impedances are low the lower voltage delta will be equal between the three lines. In using banks of transformers in this manner the total loads im-

posed must be noted as the current in the lower voltage delta is twice that of the higher voltage delta for the same k-v-a.

Circuits may be transformed from three phase to two phase, or the reverse, by using two transformers, one with a 50% tap and the other with an 86.6% tap. This is called the "T" or Scott connection.

The use of six phase circuits is often common with rotary converters. The two or three phase circuit is changed to a six phase circuit by interconnecting the transformer secondaries to get phase displacements. In the two phase case connections of two "T" circuits are made with the two T's in opposition to each other. With the three phase circuits the six half secondary windings of the three transformers are connected in two deltas which are connected at a phase displacement. The connection may also be made in a diametrical manner in which the six leads of the three secondary windings go directly to the rotary slip rings or the secondary windings may be connected in an interconnected star.

Southern Paperboard Expansion—Georgia (continued)

(Starts on page 62)

two rooms being approximately 155 ft.

Three Oliver United 11 ft 6 in. diameter by 16 ft long vacuum washers with intermediate repulpers and final repulper were installed on the operating floor of the wash room, with space provided for a fourth future washer if desired. Three Claflins were placed ahead of these new washers.

Stock is being furnished from the existing pumps, which have been equipped with variable speed couplings.

To protect the Claflins, permanent type magnetic separators were supplied in the stock lines.

A 16 ft diameter steel horizontal filtrate tank has been provided for each washing stage, with the necessary black liquor dilution pumps. The tanks are con-

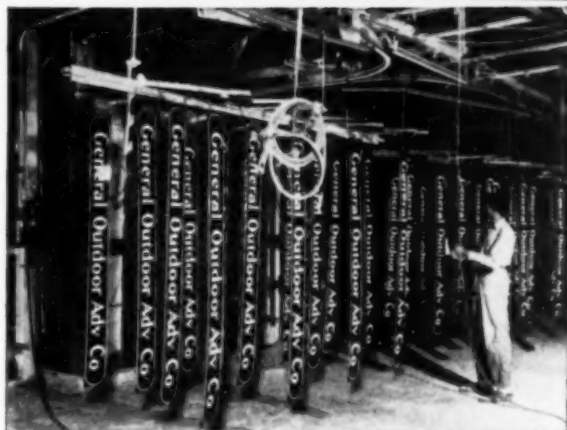
nected by foam lines to a 20 ft diameter by 60 ft high steel foam tower; the latter and strong black liquor filtrate tank each being equipped with an Oliver United foam breaker.

Over the new line of washers a J. O. Ross Engineering Corporation hood has been installed, with fans for exhausting vapors to outdoors.

Stock from the new washers and the present Line "A" washers is normally to be discharged at high density. The high density stock is to be taken by a Link-Belt Company rubber belt conveyor to a 33 ft diameter by 60 ft high steel high density storage tank outside of the building, which has been furnished with Improved Machinery agitation and dilution equipment.

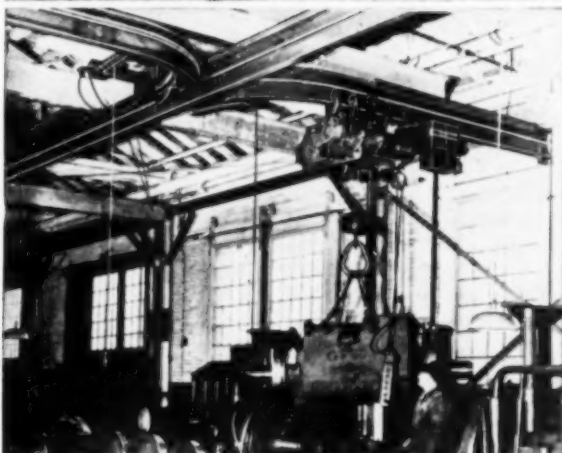
(Continued on page 78)

what MONORAIL can do . . .



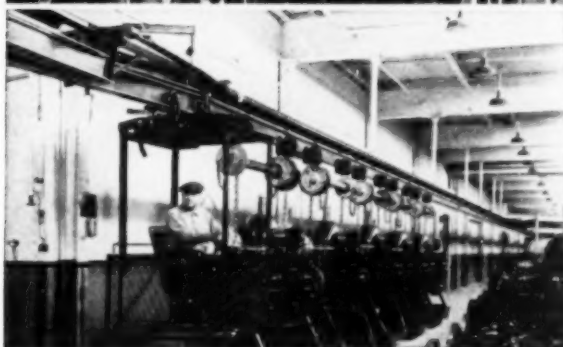
WHERE SPACE IS LIMITED

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TO MOVE VARIABLE LOADS

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Atomic Energy and World Fuel Reserves

ANNOUNCEMENT by the AEC that it will build jointly with the Duquesne Light Company of Pittsburgh, Pa., the nation's first full-scale nuclear power plant and put it on Duquesne's electric lines, formally ushered in our new atomic age (see May 1954 issue of *SOUTHERN POWER & INDUSTRY*). Westinghouse is developing the plant's reactor and will build it for the AEC. The plant is not expected to produce power competitively but nuclear power plants (as they become more and more economical) will be used on a growing number of power systems.

As of today, the atomic power business is not a big enough business to warrant an enormous effort and still make a profit. Yet, more can and should be done. Atomic power (as distinguished from bombs and similar uses of the atom) is going to be a big business. Those who contribute and thereby accumulate the "know-how" of the apparatus required will find a field that will pay substantial benefits in the near future.

Big Business

To prove the future of the atomic power is big business, let's face the facts. Since the year 1800, the population of our planet has more than doubled—from a billion to well over two billion. World population is currently growing at a rate of some 200 million people per decade. We are witnessing what might be called a population explosion. Yet the demand for energy is expanding even more explosively not only in the United States, but world-wide. Mankind is ravenous for more power to drive machines, push tractors, light lamps, toast bread, percolate coffee, and run vacuum cleaners.

It should give serious concern to us all that our historic power sources fall far short of meeting definitely foreseeable requirements. Today, we are still living in the

Abstracted from a paper, "Scientific Apparatus and Instruments as Tools in the Atomic Energy Program," presented before the Scientific Apparatus Makers Association.

Coal Age—for coal, above all other fuels, yields the energy that now supports and sustains industrialized society. But even coal cannot begin to satisfy the power demand which will be felt during the lifetime of some of us. A few statistics and estimates point up the giant dimensions of the world's future energy appetite.

Since all forms of energy are involved in forecasting future needs, we begin by fixing a common denominator for heat equivalent. Suppose we take 10 British Thermal Units and raise these to the eighteenth power. This is a billion billion Btu's. Let us call such a figure one Energy Unit—as a shorthand phrase for 10^{18} Btu.

It has been authoritatively estimated that the world burnup of energy from the year 1 AD to the year 1860 was between 6 and 9 Energy Units. From 1860 to 1947, 4 Energy Units were used—roughly half the consumption of the preceding 2000 years in less than a century. During 1950 alone, 0.2 of a Unit was consumed. Pause and contemplate that for a moment. Less than 9 Units in 1,860 years, yet one-fifth of a Unit in one year alone. The present annual world consumption is moving still higher—and at a faster rate.

Future Consumption

The outlook for future consumption may be considered from both

By W. E. SHOUPP

Assistant Manager, Atomic Power Division
Westinghouse Electric Corporation

Abstracted by JOHN F. LEE

Professor of Mechanical Engineering
North Carolina State College
Raleigh, North Carolina

static and dynamic points of view. The static outlook assumes that the world will burn energy at a fixed rate, say at one-fifth of a Unit per year—equivalent to 20 Units per century. But since consumption has been rapidly accelerating, it seems reasonable to expect an increasing rather than a fixed rate. If this is valid, the world may find itself burning something like one Energy Unit per year or 100 Energy Units per century by the year 2000—and that's only 46 years away.

Energy Sources

Where will all this energy come from? It will not come from the sources of the past—not even from coal.

The United States Geological Survey estimates that the world's total available coal reserves contain approximately 68 Energy Units. A report made by Palmer Putnam for the Atomic Energy Commission states that 30 Units is a more meaningful figure when the quantity recoverable at reasonable costs and conversion waste is considered.

The Bureau of Mines points out that as we dig deeper into the earth for coal and process the poorer veins, costs are bound to increase—notwithstanding improved techniques and new inventions. The Bureau therefore places economical world coal potential at about 6 Energy Units.

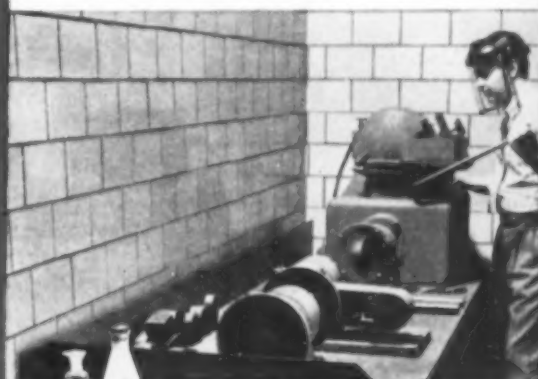
The outlook for petroleum and natural gas is far less favorable. Although new wells are being discovered at a rate which exceeds present-day consumption, neither oil nor gas can meet actual world energy demand even now—much



◀ Heat-treating and physical testing equipment shown at left is used for quality control of welding operators and for development of new welding procedures.



▲ This Rockwell hardness testing machine measures the hardness of weld specimens as a guide to proper procedures for heat-treating of welds.



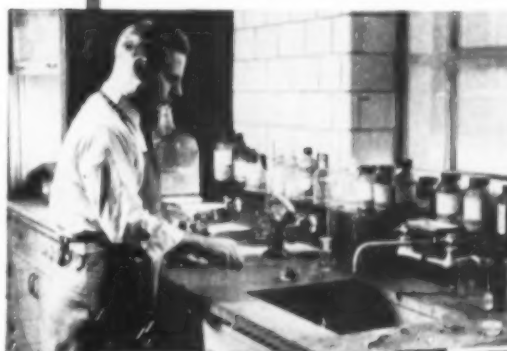
▲ A laboratory technician cuts a sample from a pipe weld prior to grinding and polishing for metallographic examination.

**Daily rigid testing
is your insurance of
quality welds in**

NAVCO FABRICATED PIPING

At Navco, a continuous parade of weld specimens are processed in the new, modern physical-chemical testing laboratory. It is here that weldments are studied metallographically and tested physically—all on a rigid schedule of quality control practices. Navco customers have benefited from progressive quality control practices for more than 40 years; they have come to know that piping installations, engineered, fabricated and erected by Navco, are precise, accurate and dependable.

Call on NAVCO for your next piping job.



▲ Here a weld specimen is etched to outline the grain structure for further metallographic study.



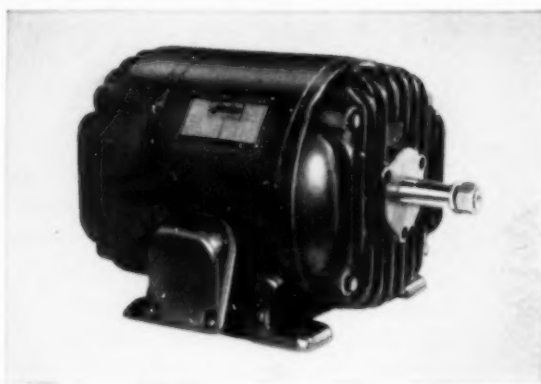
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Westinghouse Lint-Tight Starter (NEMA Class 1A) is sealed by a Neoprene gasket that surrounds the opening and positively shuts out lint. There's no fire danger, no faulty operations, no gummed-up mechanism. The rotary handle, a special type, leaves no troublesome opening in the cover.



Life-Line® Loom Motors are totally-enclosed, non-ventilated, constant-speed types designed especially for this service. Oversized bearings with locked construction and the use of a special compounded grease assure long motor life. They have ample overload capacity for new looms.

Westinghouse is organized to serve the South

9 Apparatus Repair Shops in Atlanta, Baltimore, Baton Rouge, Birmingham, Charlotte, Fairmont, Fort Worth, Houston, Huntington.

13 Engineering Service Offices in Atlanta, Baltimore, Beaumont, Charlotte, Dallas, El Paso, Houston, Huntington, Louisville, Memphis, New Orleans, Norfolk, Richmond.

8 Renewal Parts Warehouses in Atlanta, Charlotte, Dallas, El Paso, Fairmont, Houston, Huntington, New Orleans.

New plants like this Westinghouse electrode plant at Montevallo, Alabama, are both cause and effect of the South's soaring industrial growth. Loaded with ultramodern facilities for manufacturing and materials handling, it's the only welding rod plant in the South. Further evidence of Westinghouse expansion: new lighting equipment plant at Vicksburg, Mississippi; new air conditioning plant at Staunton, Virginia; new lamp plant at Little Rock, Arkansas; new meter plant at Raleigh, North Carolina. Backing them is a service network (below).



Westinghouse builds 5 new plants for new products in South

A great deal of Southern power is generated in equipment built by Westinghouse. Simultaneously, first-rate Westinghouse equipment helps Southern industry use this power efficiently. We're proud that an increasing amount of our apparatus is produced in the South. We're happy to help push upward the spirals of power consumption and industrial output.

Boosting the trend toward new processes—in the chemical, textile and paper industries, for example—are two factors: new electrical equipment and advanced engineering ideas. Westinghouse supplies both. Our own manufacturing plants

offer evidence of what we can do for you. **New Westinghouse products** cut man power needs. They not only contribute to increased automatic operation, but also wipe out maintenance hours. The two products pictured here are sturdy samples. Ask your nearby Westinghouse representative about them—or about any electrical product, problem or process. Behind him is a team of industry engineers, research engineers, and product specialists who help him make one, all-inclusive recommendation. Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania J-96026

YOU CAN BE **SURE**... IF IT'S
Westinghouse



Atomic Power is Big Business (continued)

less later. The United States is believed to possess $\frac{3}{8}$ of the world's oil reserves but, according to estimates, this is now 61 per cent depleted, and the nation must currently import 10 per cent of present needs.

The Putnam study estimates that world oil and gas reserves are estimated at 6 Energy Units but concludes that quantities economically recoverable aggregate only 0.4 of a Unit. It seems probable that within two decades the gap between demand and production of petroleum, and possibly natural gas, will have grown seriously wide.

Water power has supplied only a small fraction of our past needs and promises little relief for the future. The theoretical total water power, considering all the rivers and streams on earth, has been computed at one Energy Unit annually. Only a minor share of this potential can be realized. As a practical matter, the flow of water cannot be economically harnessed, except when it drops over falls in large rivers. The present best estimates of maximum realistic potential from the water source is .02 of a Unit per year.

All other non-nuclear sources combined — wind, earth's heat, tides, atmospheric electricity, extracts from natural gas, and the like could at best supply only about 0.6 of a Unit.

It seems dramatically obvious that when we measure forecasted energy requirements against conventional energy reserves, the books just do not balance. We are on the road to depletion. Coal, the most abundant fuel of the past, is good as a major but still limited source for perhaps three-quarters of a century. Petroleum and gas may last 20 or 30 years, whereupon the partial contribution they can make seems sure to decline. Water power and other replenishable sources are enduring but comparatively insignificant.

Atomic Power

From where, then, is our future energy going to come? The only new sources that seem promising

are to be found in the nucleus—either the nucleus of our solar system, the sun itself, or the nucleus of the atom. Solar energy is not an early prospect, but atomic power is. Does atomic power measure up to the forecasted requirements? The answer is an emphatic, Yes.

According to the most authoritative estimates, economically recoverable uranium reserves could provide about 1700 Energy Units. Added to this are about 70 Units available from recoverable thorium reserves. Here is a total of almost 1800 Units—a downright startling number when you remember that it represents 1800×10^{18} Btu.

The figure must be reduced somewhat, however, because only about 85 per cent of the uranium furnishes energy when losses and conversions are factored in. But a revised estimate still leaves our usable potential at about 1500 Units. Such a potential would service the world for centuries and would give time for developing the

art of harnessing energy from the other nucleus, the sun.

No Other Choice

The real issue at hand is not whether atomic power is, or ever will be, cheaper than fossil fuels. Actually I believe that, in time, the atom will compete with conventional sources, but this is beside the point. We really have no other choice. We are compelled to develop atomic power commercially, regardless of comparative costs. There is no other way to close the widening gap between energy reserves and future energy requirements.

Today our country is caught up in a dangerous struggle between two sets of ideas on the nature of the physical world and all the ways that men and nations ought to follow in their relationships with one another. Our ability as a nation to lead our forces and our allies in this struggle depends upon energy reserves—and we have led the world in consuming them. We must now take the lead in developing this new atomic source if we as a nation and our way of life are to survive.

Southern Paperboard Expansion (continued)

(Starts on page 62)

Between the washed stock storage tanks and screening equipment, seven Sprout-Waldron single disc refiners, each driven by a 450 hp motor, have been installed. The consistency of the stock to these refiners will be controlled by DeZurik pressure type regulators.

Four new improved Machinery centrifugal screens have been added to the eight present screens. The new screens are provided with agitated mix box, flow box, and poppet type inlet valves.

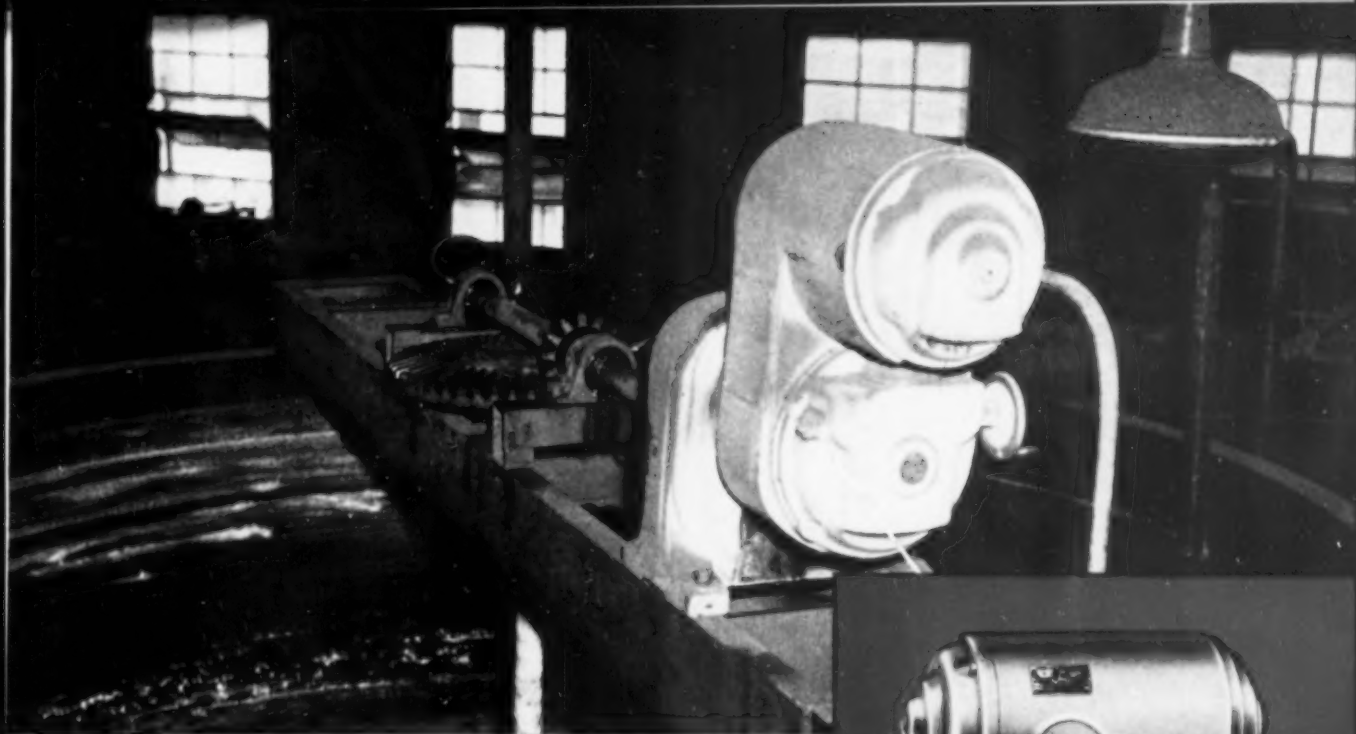
For thickening the screened stock and also to serve as savealls for the paper machine white water, two Oliver United 8 ft diameter by 16 ft vacuum deckers were purchased. The stock from these deckers is to be discharged into a new Chemical Linings tile storage chest equipped with Impco agitators. The white water

from the savealls is to be collected in a tile chest and used for dilution water as required in the stock preparation system.

Rejects from the centrifugal screens are to be pumped over a Sprout-Waldron drainer, then refined through an existing disc refiner of the same make prior to being returned to the centrifugal screens for further screening.

Paper machine—The following changes were necessary to the paper machine and auxiliaries:

The steam pressure to the dryers was increased to 70 psi; two additional Nash vacuum pumps were provided for the couch roll; separators and condensate pumps were added by Midwest-Fulton for the Dryer Drainage System; additional agitator and stock pump were furnished for the couch pit; and three exhaust fans added to the paper machine hood.



THE HUMKO CO. GETS EXACT SPEED CONTROL ON MIXERS WITH SPEED-TROLS

Mr. J. H. Kirby, Vice-President of The Humko Co., writes: "In processing vegetable oil and shortening we must drive our mixers at various speeds... a Speed-Trol was installed for this purpose... we were so well pleased with its performance that we installed Speed-Trols on *ALL* of our vegetable oil mixers... Speed-Trols give the exact speed regulation needed for vegetable oil processing."



Industry Names Speed-Trol Production Advantages

In a nation-wide user survey of Sterling Speed-Trol Variable Speed Electric Power Drives:

86% Increased Production. **48%** Improved Product Quality. **64%** Reduced Production Costs. **42%** Modernized Equipment and Machines. **20%** Reduced Spoilage and Rejects. **28%** Increased Machine Versatility. **18%** Increased Plant Safety. **34%** Improved Employee Morale. **62%** Lowered Maintenance Costs.

46% Saved Space. **18%** Simplified Operations. **16%** Synchronized Operations.

Investigate the possibilities of bringing some of these Speed-Trol production advantages to your plant. Sterling Engineering Sales Offices and over 400 Distributors and Service Shops throughout the nation effectively serve every industrial, commercial and agricultural area.



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...Sterling Speed-Trol, Slo-Speed, Klosd and Klosd-Tite Electric Power Drives. Write for catalog No. J-433.

There is a Sterling Electric Power Drive to Meet Virtually Every Requirement

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**Fairchild in Maryland doesn't just
aim to put-on-a-show . .**

GOOD HOUSEKEEPING Makes Money

WHAT industrial housekeeping means is order—planned order—more than appearance. While it is highly desirable that our plants be spic-and-span, it is much more important business-wise that they also be ship-shape. For good order—the real ingredient of good housekeeping—very definitely influences two direct money-making factors: efficiency and safety.

Order denotes definite, methodical planning. It implies regularity, convenience, ready accessibility, and functionalism in arrange-

ment. It denotes better utility, simplicity, and a suggestion of precision. It induces a sense of pride and satisfaction in a man's mind.

The difference between good and inferior housekeeping is the difference between order and dis-

By putting substance into their industrial housekeeping, Fairchild Aircraft influences efficiency and safety and makes money. The show takes care of itself. Here are the highlights of the program.

order. Order is constructive, whereas disorder is devastating. There can be perhaps as much waste in an industrial plant attributable to disorder as there is in the physical scrap material generated in a day. The difference is that material scrappage can be seen and weighed and measured. Inferior housekeeping is a silent, stealthy, hidden source of wasted effort, money, and time. But the



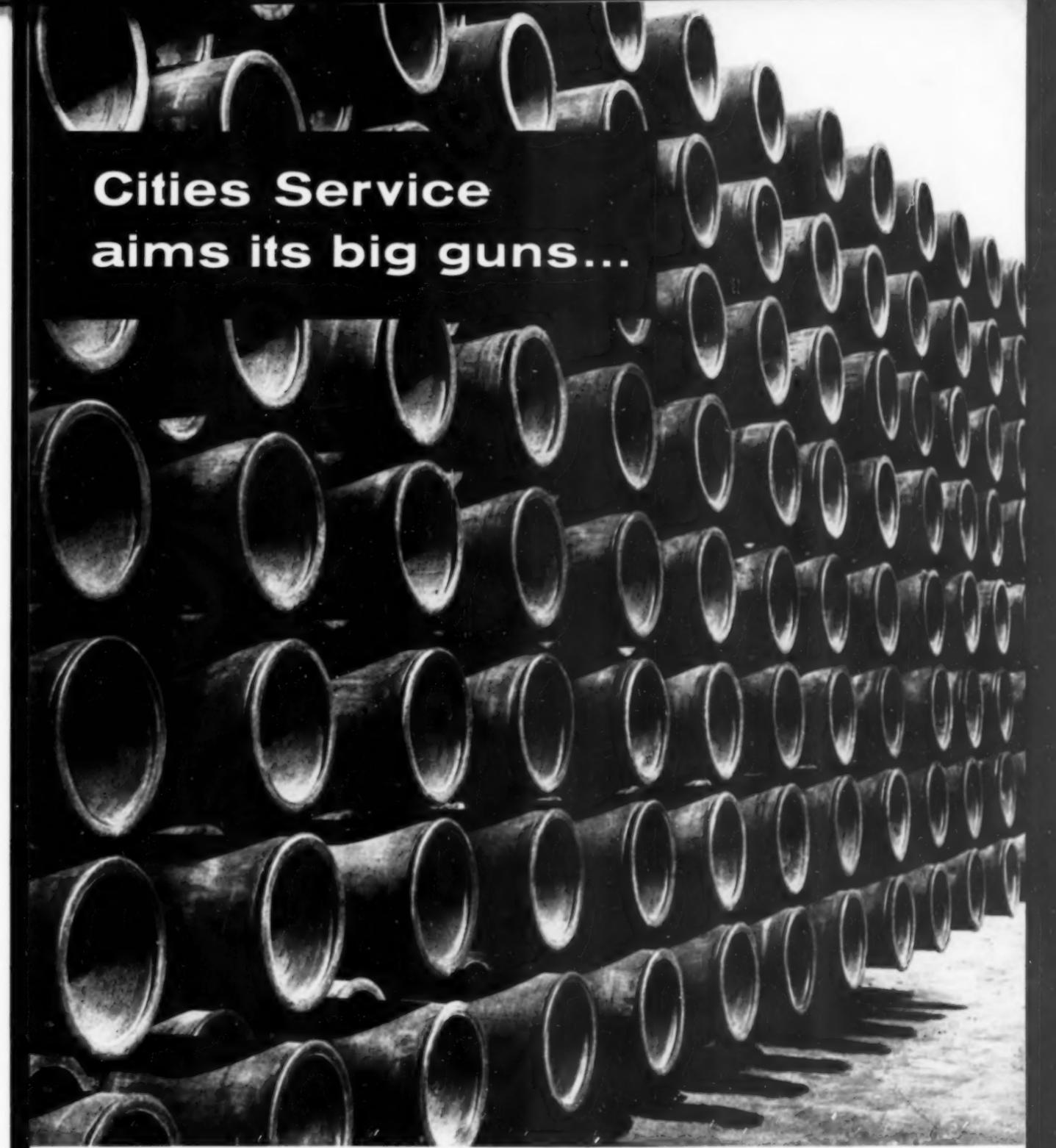
EVIDENCE of Fairchild Aircraft's good housekeeping practices may be found in this view of the company's final assembly area where the C-110 Flying Boxcar is manufactured. Such rock-bottom good housekeeping—the real thing—cannot be established overnight. It has to be worked at continuously.

By GEORGE W. LESCHER

Fairchild Aircraft Division
Hagerstown, Maryland


THE AUTHOR—Mr. Lescher, a member of the management staff of Fairchild Aircraft Division at Hagerstown, Maryland, is chairman of a three-man Projects Evaluation Board set up to appraise the merits of design changes and redesigns proposed for Fairchild airplanes.

He has been with Fairchild since 1942, and previous employment in the industry has included engineering positions with Republic Aviation, Sikorsky Aircraft, and General Aviation, now North American Aviation. Mr. Lescher was born in Little Rock, Arkansas, and attended M.I.T. His first position was as a civil engineer in Little Rock and he later served in a similar capacity in Chicago.



**Cities Service
aims its big guns...**

Acres of casing are mobilized in readiness at a well site. Last year an average of $1\frac{1}{3}$ producing wells were drilled every day by

CITIES  SERVICE

A Growth Company



THE POSITIVE APPROACH—At each department station in the Hagerstown, Maryland, factory one of these signs is conspicuously displayed. The signs perpetuate a running consciousness of the need for everyone to continue to exercise care—the safety aspect of good housekeeping.

waste due to disorder — inferior housekeeping—is just as real in terms of dollars as that due to other more visible causes.

The organization that permits inferior housekeeping goes to bat at the start of each day with one strike against it, a fixed, inherent, self-imposed penalty, one less chance for best success, a loss chalked up against it for that day. The kind of housekeeping a plant practices actually tends to set in part its economic base. Good industrial housekeeping consists primarily of three factors, ranking in importance in this order: Efficiency aspects, Safety aspects, and Appearance aspects.

The efficiency aspects obviously are the time and labor savers; they are manifested by planning and by steps taken throughout the plant simply by means of arrangement, placement, and improved functionalism. They are conducive to a positive influence which is constructive rather than to a negative one which is deteriorating. These aspects are the ones which create more dividends than would otherwise have been produced from the available man-hours and facilities.

The safety aspects are the time, labor, and equipment preservers. They are the ones through which the man-hours and equipment

which we already have available can be retained to the maximum, instead of reduced. Industrial safety applies to the preservation or safeguarding of equipment, materials, and products, as well as of people. As such, they constitute a direct economic factor.

The appearance aspects, though quite indirect and less concrete, are money-makers too. Their influence on employee morale, attitude, and workmanship by the creation of an atmosphere of encouragement rather than of futility, and by the creation of a psychology of orderliness in thinking and in action, is of consequence to the overall effectiveness and productivity of the organization.

Scope and Ramifications

Therefore the kind of housekeeping we are talking about must penetrate deeply into both the general and detail planning of plant and floor layout, and arrangement and relative locations and methods of installation or placement, of all the countless plant items of fixed equipment, movable and moving equipment, and storage and handling facilities for both materials and equipment. It also must penetrate into the design of tools and fixtures, and processing, storage, holding, and conveyance facilities; and

also into lighting, and into painting, color identification, and marking of both equipment and plant facilities. It must encompass daily maintenance, disposal of waste materials, and cleaning itself.

It must be a live factor in these basic functions if maximum efficiency, order, accessibility, visibility, safety, and appearance are to be achieved.

Type of Program

How should we go about attaining this good housekeeping? First, remember—good industrial housekeeping is a constant, living thing. Short-lived campaigns or special so-called “clean-ups” in a plant—in anticipation of the visit of some influential dignitary, a board of directors, or others of special influence—do not in any except false respects constitute good housekeeping. Such things should not be required. Their practice in extreme cases might even be looked upon as constituting misrepresentation.

Rock-bottom good housekeeping—the real thing—cannot be established overnight. It has to be worked at continuously. It is an active, long-range program. Once acquired, it must have unending nurturing and maintenance, without which it will deteriorate rapidly. It cannot be acquired or maintained by decree, mandates, or ultimatum; it must be voluntary, but it must have a continuous perpetuating spark somewhere high in the organization. It is achieved by psychology and salesmanship. To do it, the good housekeeping idea must be championed by management, from where it must be infiltrated and installed by some means into the mind, as a way of thinking, of all the people in the organization. It requires vigilance.

How Fairchild Attains It

Just how can it be done? First, Fairchild management is either endowed with, or once acquired, a firm belief in it and lets it be known. Management is aware of and convinced of its economic necessity, and sparks it continuously as an integral part of the com-

Assembly Line Steam Trap Maintenance Saves Time and Money

**It costs less
to repair a
group of traps
before they all
need it than to
wait and repair
one at a time**

CHART I—COST OF LABOR FOR ONE TRAP

(assuming labor at \$2.00 per hr.)

LABOR	MINUTES	COST
Get parts from store room	3	
Get tools	2	
From store room to trap	5	
Shut off steam	1	
Wait for trap to cool	5	
Remove cap and mechanism	2	
Replace Valve, Seat and Lever Assembly	4.5	
Remove old gasket and clean gasket surface	2	
Apply gasket dope	1	
Put on new gasket	1	
Install cap with mechanism	2	
Turn on steam	1	
Back to shop	5	
TOTAL PER TRAP	34.5 min.	\$1.15
TOTAL COST OF LABOR FOR 8 TRAPS SERVICED INDIVIDUALLY	4 hr. 36 min.	\$9.20

CHART II—COST OF LABOR FOR 8 TRAPS SERVICED AT ONE TIME

(assuming labor at \$2.00 per hr.)

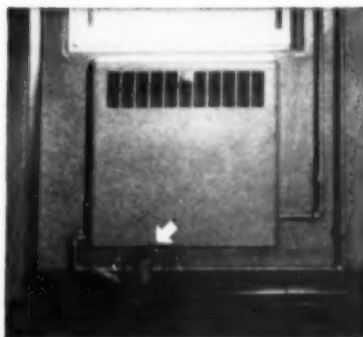
LABOR	MINUTES	COST
Get parts from storeroom	3	
Get tools	2	
From storeroom to trap	5	
Shut off steam	1	
Wait for traps to cool	5	
Remove caps and mechanisms	16	
Replace Valves, Seats and Lever Assemblies	36	
Remove old gaskets and clean gasket surfaces	16	
Apply gasket dope	8	
Put on new gaskets	8	
Install caps and mechanisms	16	
Turn on steam	1	
Back to shop	5	
TOTAL	2 hr. 6 min.	\$4.20

ARMSTRONG traps do not demand constant attention, but when they do need repairs, maintenance money can be saved by replacing parts not only in the trap requiring immediate attention, but also, in the remaining traps of that series.

For example, assume eight traps were installed on an eight-coil dryer at the time of its installation. When one of these traps becomes worn to the point of needing replacement parts, there is a direct savings if all the traps receive new internal mechanisms at the same time.

Several traps draining the same machine, receive approximately the same wear. When one trap becomes worn to the extent of needing new internal parts the others will be soon to follow.

If the remaining traps have an average of 10% service life, before requiring repair, and the cost of a new valve, seat and lever assembly were approximately \$4.00, replacement before absolutely necessary would involve a loss of \$0.40 per trap. However, the labor cost involved will more than make up for this loss.



Armstrong No. 800 draining a condenser at Globe Steel Tubes Company. Parts for this trap cost only 2¼ cents per year. Average trap life is 11 years.

Chart I shows that the cost of labor involved to service one trap is \$1.15. Therefore, repair labor for eight traps serviced individually would cost approximately \$9.20.

Chart II shows the cost of labor involved to service all eight traps at the same time. Here we find the labor cost is only \$4.20. This leaves a labor profit of \$5.00.

The loss of \$0.40 per trap times the remaining seven traps is \$2.80. Subtracting \$2.80 from \$5.00 leaves a profit of \$2.20 gained by servicing all eight traps at the same time.

Thus, if traps are put on regular maintenance schedule and assembly-line servicing is employed, a very definite profit can be shown, plus the assurance of maximum operating economy at all times. Traps are kept in tip-top shape, eliminating steam or fuel waste that might occur if the trap is not caught before it goes bad.

Your local Armstrong Representative has parts in stock and valuable trap service knowledge to help you. Call him, or write:

ARMSTRONG MACHINE WORKS
806 Maple Street • Three Rivers, Michigan

FREE MAINTENANCE BULLETINS—

Bulletin No. 239 is an 8-page trap Service Guide; Bulletin No. 292 tells how to save money on trap repairs. Send for them — no obligation.



ARMSTRONG STEAM TRAPS



THE NEGATIVE APPROACH is unquestionably positive in results. This 6 x 4 ft sign, painted on both sides, shows a typical hog pen with litter about. It doesn't have to be used too often, but when it is, it takes effect quite promptly. The recipients, suddenly becoming sensitive to what others think about them, seldom enjoy keeping it for more than a few days.

pany's approach to an all-around, sound manufacturing operation.

Through continuing observations and comments to higher level departmental supervision, management keeps uniformly alive the thought and policy of good housekeeping. Departmental management, through the medium of regular weekly supervisory meetings on all current matters of operation, continues to sustain awareness of the policy through its key supervision, thence through lower supervision, and ultimately throughout the organization. The subject, by concerted effort, is kept alive.

We have an **Approved Rating Committee**, the existence and diligence of which is most effective in regularly keeping before all levels of supervision the degree of actual effectiveness of its effort to maintain good housekeeping. It consists of three members, one from Manufacturing, one from Inspection, and one from the local Air Force office. Without any ad-

vance notice, it makes surveys about once each month. Corrective action is promptly taken if and where it is found necessary to maintain established standards.

Because of the conviction that good housekeeping must be a constant, living thing, we use as a regular practice several other direct methods which were devised either solely or in large part for assuring the maintenance of good housekeeping.

One of these is a so-called **Award Evaluation** which is made every two months, a rating of the relative performance of the various departments of the production organization. While these evaluations include a number of factors, one of the most important is housekeeping within the areas of the respective departments.

For the winning department at each two-month interval there is a worth-while award, an outing or a trip at company expense for the entire supervisory force within that department, including

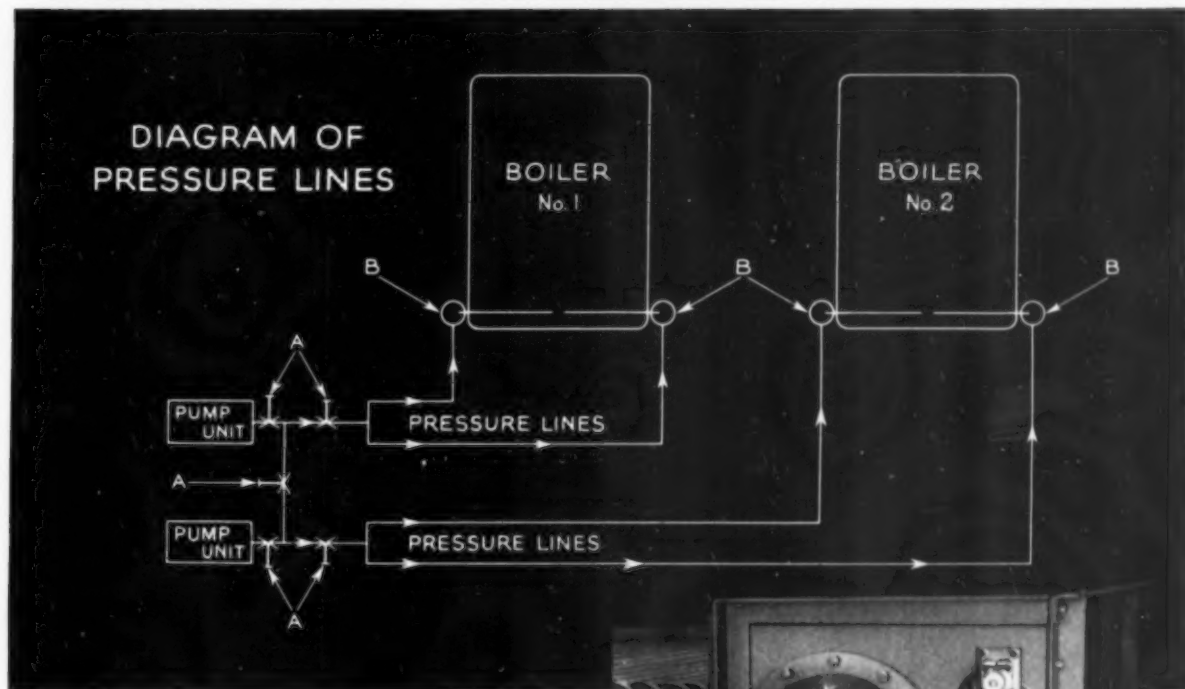
such supporting supervision as that of inspection, tool and stock cribs, and parts control. The rating is done—with considerable thought and discretion—by Manufacturing management. These awards take the form of a weekend fishing trip on the Chesapeake, a trip to an Icecapades show in Washington, or a weekend at Hershey Park, Pa. On occasion, the award goes to a group of some 30 or 40 supervisors.

We have another method, initiated and instituted by direct supervision itself in one of our plants. These supervisors survey each other's areas for good housekeeping, and are quite critical of conditions which could be improved. Shortcomings are usually rectified voluntarily and without prompting from higher supervision. The psychology of this, of course, is that by habit and by becoming acclimated to a condition we frequently become oblivious to it. We are too close to it, and we "can't see the woods for the trees."

It is possible that another of the methods we use to promote a consciousness—and an effectiveness—of good housekeeping is somewhat unique, especially among concerns employing relatively large numbers of production employees. **Production personnel** in each of the manufacturing departments at our plants, irrespective of labor grade, do various housekeeping chores and premise cleaning (even to floor sweeping) before quitting time and at regular intervals during the day or as required. In certain areas, particularly around the larger fixtures, different individ-

(Continued on page 114)

PERFECT SPREAD STOKER



permits hydraulic
dual grate drive
for maximum dependability

ALL Continuous Ash Discharge Perfect Spread Stokers can be driven by a single power unit. The fluid power pump feeds cylinders "B" on both sides of the grate. This hydraulic system makes it easy to interconnect two stokers and provide for *dual drive* . . . assurance of uninterrupted service in an emergency as one pump will drive both grates by opening or closing valves "A" (See diagram).

In addition, the AE hydraulic drive assures smooth operation, requires less power and maintenance, and gives an infinite choice of speeds from zero to maximum. Automatic overload protection built in. Complicated and aisle-blocking reduction gears are eliminated. The pumping unit can be located next to the stoker or at any convenient place in boiler room or basement.

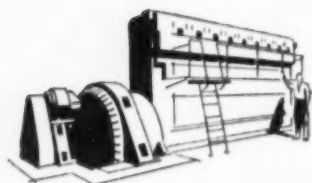
Write for full information about the AE Perfect Spread . . . the stoker that provides true, continuous feeding of 50 to 7500 lbs. of coal per hour per feeder and never clogs, *not even on wet coal*.



**AMERICAN ENGINEERING
 COMPANY**

2421 ARAMINGO AVE., PHILADELPHIA 25, PA.
 IN CANADA: AFFILIATED ENGINEERING CORPORATIONS,
 LTD., MONTREAL 2, CANADA

AE Products are: Taylor and Perfect Spread Stokers,
 Marine Deck Auxiliaries, Hole-Shaw and Hydramite Fluid
 Power, Lo-Hed Hoists, Lo-Hed Car Pullers.



**"Cured...
bearing failure
in their
diesel-driven,
front-end loaders"**



A large fire-brick manufacturing company in the Philadelphia area had the problem of premature bearing failure in its diesel-driven loaders and shovel.

Headlights on even in daylight...

Sinclair Lubrication Engineer Harry Donovan reports, "These units were operating around the clock under conditions *so dusty that headlights were required*. Crankcases had to be drained and flushed bi-weekly! My first recommendation was closer adherence to an air filter maintenance program."

Drain intervals doubled!

Mr. Donovan continues, "Further observation proved to me that excessive idling and overloading were all contributing factors to a severe sludge condition. I recommended Sinclair SUPER TENOL® — explaining that the superior quality of the base oil plus the Sinclair formulated additives would extend bearing life *while at the same time removing accumulated lacquer and sludge*. A trial period proved SUPER TENOL doubled drain intervals and eliminated flushing entirely. This company now uses Sinclair SUPER TENOL exclusively."

Why not give a Sinclair Lubrication Engineer the chance to solve *your* lubrication problems? *There's no obligation*. Contact your local Sinclair office or write Sinclair Refining Company, 600 Fifth Avenue, New York 20 N. Y.

SINCLAIR LUBRICANTS



HELPING the *MAN-IN-THE-PLANT*

Ideas... Methods... Gadgets

Emergency Hoist for Concrete

A LUMBER shed built semi-permanently, with a nearly flat roof (350 ft x 125 ft) supported by posts strategically placed, developed trouble with one of its thin 15 ft high end walls.

The wall foundation had settled out of plumb so badly that when the trouble was discovered, the

roof at that end had partially slipped off the wall and was about ready to collapse into total ruin.

First, the entire damaged end of the roof was jacked up and supported on temporary posts, so that some attempt at straightening the wall could be tried.

There was nothing in the body

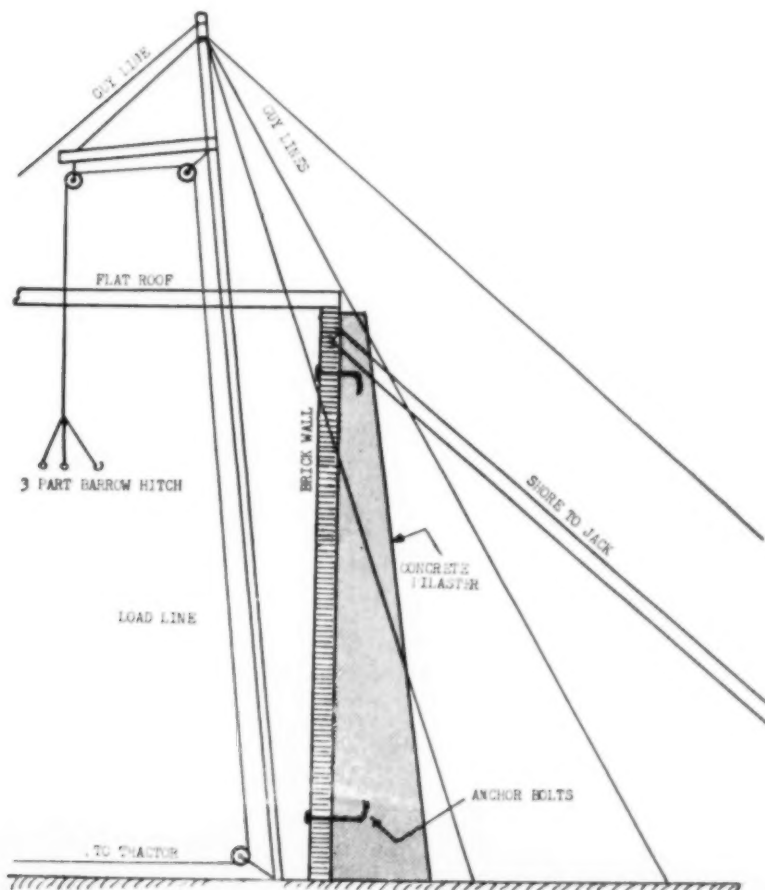
of the fragile building that was solid enough to provide an anchorage from which to pull the top of the wall back to its original position. Therefore it was decided to set up a number of shores and jacks, with the shores slanting down to the ground at an angle of about 45 degrees, and (as gently as possible) coax the wall back to plumb position. Then pilasters had to be placed to permanently hold the wall plumb.

Five pilasters were decided upon, to be set along the length of the wall on its outside, and designed to be three feet long by two feet wide at the base—each pilaster setting upon an adequate footing and tapering to a smaller size at the top. Each pilaster was anchored to the brick wall at the top and bottom. They were made of concrete and poured in place.

While the crew built the forms and placed the anchor bolts, the foreman faced the problem of how to hoist some 20 yards of concrete up to the tops of those fifteen foot high forms and get it poured at a justifiable cost. He had no crane or hoist of any kind, and if his crew went at the job bare handed, this would bring about extreme cost to the company and severe punishment to the crew.

The job was too small to justify a wooden concrete tower and going outside to hire a hoisting engine. Wheeling concrete that high up a ramp was too expensive.

He did have a small tractor at his command, and by scratching around he found a length of good 3 inch pipe and enough rope to set up a gin pole hoist. But as in many small plants the dearth of such material made any rigging job a



Ideas . . Methods . . Gadgets (continued)

matter of hoping he had enough material to handle the proposition in one way, then finding out he had not, and figuring out another way that would fit both the needs and the equipment in stock.

So here is what he came up with. He was buying the ready mixed concrete, and one of the requirements was speed in unloading the concrete company's trucks to avoid a penalty for delays which would hold the trucks too long.

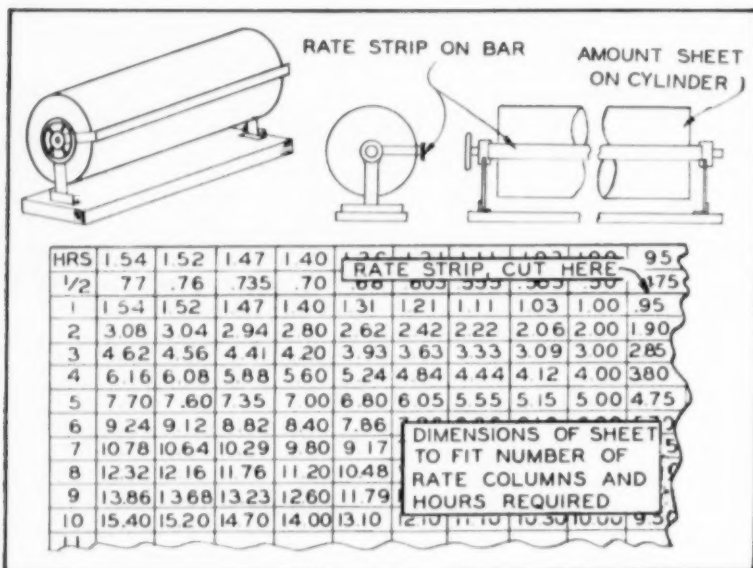
He screwed a coupling on each end of a long 3 inch pipe. In the end that was to be at the top, a second short piece was solidly screwed; the other coupling at the ground end was placed on a wooden pad, and served merely to protect the pipe threads.

On top of the upper coupling, he

placed a 4 ft wooden boom, secured to the pole by an iron strap solidly spiked to the boom on both sides, and passing around the pipe just above the coupling. Then a short guy line from the boom's end to the pole top completed a setup that could swing around the pole enough to allow his loads to clear the edge of his landing platform, but still allow them to be swung over the platform and be landed.

The hoisting rope was threaded through a pulley hung on the end of the boom. On the load end of his hoist rope he made a three part hitch; two parts carrying rings to slip over barrow handles, and the third equipped with a hook to engage the barrow wheel when hoisting.

When the pole was properly set



Homemade Pay Calculator

A SIMPLE pay calculator can easily be made in most any shop, from available materials. The sketch shows one practical design, but each mechanic will have individual ideas, depending on the materials used. Naturally, the accountant will want to furnish exact data for the figures shown on the roll.

Straight time, accurate to 1/2 hour, can be read directly. For "time and a half," merely take 1/2 of the overtime and add it to the total hours worked—then use the calculator.

This device saves lots of pencil pushing and mistakes.

By H. C. NORMAN,
Master Mechanic,
West Boylston Mfg. Co.,
Montgomery, Ala.

\$\$\$ For Your Ideas

Send your ideas, methods and short-cuts to Southern Power & Industry. Payment is made for suitable material—a photo or rough sketch will make your idea more valuable.

Articles from maintenance and production men in Southern and Southwestern plants are preferred. Material must not have appeared elsewhere nor been sent to another publication.

Southern Power & Industry
806 Peachtree St., N.E.
Atlanta 5, Georgia

up and guyed, the tractor was attached to the hoist line, and manned by a careful driver.

In operation the concrete mixer filled a barrow, which was then wheeled a few feet and attached to the hoist rope by slipping the two rings over the handles and the hook into the barrow wheel. As the tractor man started hoisting, the ground "hook man" steadied the sway, and as it reached the landing platform the top man swung it over the platform. Then the tractor man reversed and lowered the barrow to the staging. The barrow was unhooked, and wheeled to the forms, while an empty was picked up by the hook only and lowered to the ground—completing the hoisting cycle.

The tractor man, sensing he had the advantage with a "whip" line, started speeding the hoisting and soon had the rest going at top speed, as no man in the gang would admit he could be overcrowded. Someone passed the word to the office crew and as many as could get away, came down to watch the show, and asked, "How do you get 'em to work that way?"

In any case the forms were filled at high speed, and the rig was very quickly taken down and its parts stored. As soon as the concrete had hardened, the roof was lowered to its former place on the wall top and the forms were stripped. The outside shores that held the wall in place while the concrete was being poured were removed, and the wall was again performing its intended function.

By H. B. McDERMID

Air Conditioner Failure

RECENTLY in a hotel, a six-ton packaged air conditioner, during a particularly humid weather period, developed frost on the gas return line all the way to the compressor. The air filters were checked but found in good condition. The expansion valve appeared to be functioning properly, so the evaporator and piping were allowed to defrost and the machine was returned to service.

The following day trouble developed in the compressor. The moment the compressor was switched on the line fuses would blow. Tests were conducted on the compressor motor (the unit being a hermetic type) to determine whether a ground or open circuit was present, but everything tested ok. The system gas pressures were checked and found to be normal. So it was assumed that either the motor windings were short-circuited or the compressor was jammed. Consequently a service man was summoned from the firm that had installed the conditioner.

After additional checks, the service man, too, came to the conclusion that the compressor must be mechanically at fault and decided to open it. Examination disclosed one of the four connecting rods broken and sufficient piston distortion and cylinder wall damage to prevent rotation of the shaft. Since it was inadvisable to attempt repair work in the field or in the dealer's shop, the unit was returned to the manufacturer and a new one was furnished.

The day following installation of the new compressor unit, it was noticed that it was unusually noisy at times, so the dealer was again notified and a different service man was sent. This mechanic checked the air delivery of the conditioner and found it below normal. Further investigation discovered that the adjustable pitch pulley on the air fan had gotten out of adjustment, due to a loose set screw, and, as a result, the drive belt had lost tension, slowing the fan speed considerably.

This had caused icing of the evaporator and return line, and,

evidently, liquid refrigerant reaching the compressor, as a result, had caused the mechanical failure, since the compressor cylinders were not fitted with spring-loaded valve plates.

The fan pulley was consequently readjusted and tightened and the conditioner was returned to service. No further trouble occurred.

By THOMAS TRAIL



Portable Pipe Bender

A PORTABLE pipe bender, designed by Bryant Electric Co., of High Point, N. C., is an important item of their construction equipment. The bender has proved to be a valuable tool in that it can be moved from one part of a job to another, saving a great amount of time formerly spent in carrying pipes or conduit to a central location for bending. Now, they can be shaped on the spot where they are needed.

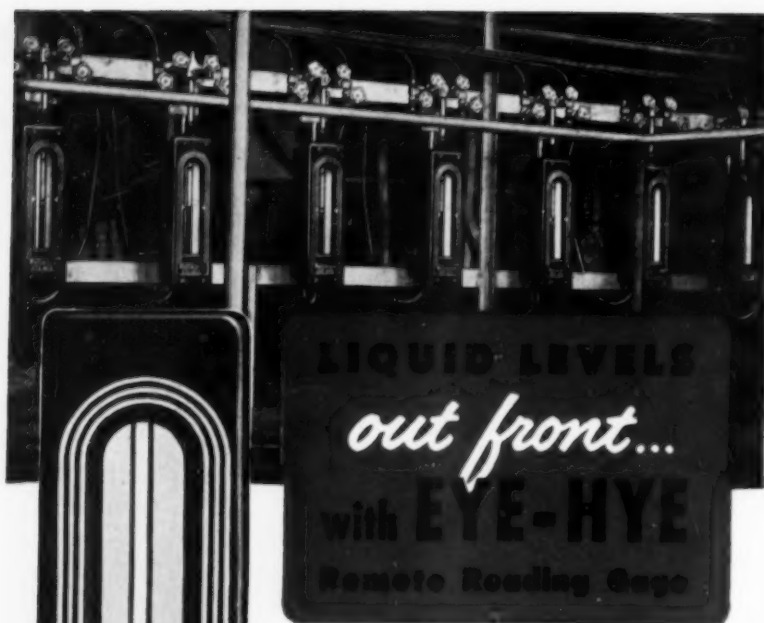
The pipe bender is made with a conventional bending head which will handle conduit up to 3 inches in diameter and will make both offsets and 90 degree bends. Pressure is applied through a 4 inch hydraulic cylinder with a 16 inch

piston stroke. An electrically driven Blackhawk Porto-Power Hydraulic Pump mounted on the unit supplies the power.

The bender is put in operation by a spring limit switch, which must be held in the "On" position for the piston to move. If the operator takes his hand off the switch, the drive motor stops. This limit switch also prevents over-travel of the piston.

The whole unit is mounted on 12 inch solid rubber tired wheels, and a hand crank and screw are used to raise or lower the wheels so that the bender can rest on its base on the floor or can be moved about from place to place as needed.

A tray is welded to one side of the unit to protect the power unit and to hold bender shoes.



EYE-HYE, the original remote reading gage, assures perfect measurement, dependability and clear reading of liquid levels — at a safe convenient distance from boilers and other vessels.

Models available cover every liquid level variation requirement — every working pressure up to 2500 psi. All models feature the distinctive illuminated green indicating fluid except a mercury type designed for storage tanks having 8 to 12 foot level variations.

And all models (except the mercury type) can be equipped to actuate additional signals — lights or horns — which warn operators when dangerously low or high levels occur.

Write for Bulletin CO and learn how EYE-HYE can increase the reading efficiency of all your liquid levels.

The Reliance Gauge Column Co.

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Ideas . . Methods . . Gadgets (continued)

Freeing Stuck Screws

A SOLDERING iron can sometimes team up with a screw driver to do a better job. Suppose a painted door has some tight wood screws that fasten hinges on a well decorated surface; and the painted-in screws have to be removed. A strong man with a screw driver cannot move the screws at all; and if he persists, the likely result is damage to the paint and perhaps badly damaged screws. Or even worse, the screw heads may be twisted off entirely.

The cure is simple. Get a hot soldering iron and apply it to the screw heads carefully (so as not to damage the surrounding paint) for a few seconds each. The heat will burn off the paint from the heads, thus destroying that cause for sticking. Also it will expand the body of the screw and slightly ease its fit in the wood. Both the screw head and body are then loose enough so the screws will spin right out with no difficulty.

The stunt works equally well with stuck lag screws, but in their case the heat applied must be greater, on account of the larger body of metal to be heated. A small acetylene torch can sometimes be used for the heating.

By M. B. Holley, Ark.

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Southern Power & Industry
806 Peachtree St., N.E.
Atlanta 5, Georgia

Looking for Leaks

MANY leaks can be quickly discovered by the use of dye. American Aniline Products Co., Chicago, is a dye manufacturer that makes a number of colors which can be used for this purpose. One is a red dye used to locate leaks on diesel injectors. The dye is placed in the fuel at the rate of one ounce to about 100 gallons. Use of a pressure tank is required.

By L. H. Houck, Mo.

Coatings Applied With Paint Rollers

PAINT rollers are being used to apply chemical coatings to metal equipment by the Gates Engineering Company, Wilmington, Delaware.

Gates is engaged in the application of protective coatings to metal equipment on a contract basis. Their work centers on industrial ventilators, heavy machinery and other types of industrial equipment exposed to corrosion. Heretofore, the company faced a bottleneck due to the large amount of floor space taken by each job and the length of time required to apply coatings.

The new paint rollers were developed in conjunction with American Products Company of New York City. They are made with a plastic core, to which is permanently bonded a Dynel cov-



NEOPRENE in liquid suspension is being spread on an industrial ventilator with a Dynel-covered paint roller. Gates Engineering in Wilmington, Del., finds that the paint roller cuts application time in half and also gives a better coating.

er fabric. This construction gives long wear-life to the rollers, which are not only exposed to constant usage with various coatings but must be cleaned in strong chemical solvent solutions.

The Dynel-covered rollers are chemically resistant, light-weight, long-wearing, easy to clean and in addition, give a uniform coat-

ing. There is no spatter or waste as with other types of paint applicators.

Principally, Gates uses a neoprene coating in liquid suspension. Other types of paint rollers have proven ineffective in working with this covering material, but the combination of Dynel with a plastic core does the job.

Bark Burning in Alabama Paper Mill

(Starts page 56)

ing boilers. It is transferred by gravity to a short belt conveyor with a Stearns electromagnetic pulley to separate tramp iron.

The discharge is to a bifurcated chute with a flop gate, which feeds selectively to either of two bark shredders. These are Montgomery Blo-Hogs, which operate on a combination hammer and scissors principle. They are located on the floor serving the steam drum.

The shredders discharge to a Fairfield live-bottom bark bin. This has 18 screw feeders covering the entire floor which is 18 ft. wide by 12 ft. long. The bark is fed across the bin toward the boiler, where it discharges into three chutes feeding the three spreaders.

The six screws feeding each spreader are gang-driven through a Reeves variable speed drive, with speed indicator and control on the instrument panel. The sides of the bin slope in sharply as they rise, on all four sides, to minimize bridging. An exhaustor system and cyclone are provided to maintain a slight suction in the bin and minimize dust.

While it would be possible to store bark and feed it at a uniform rate over the 24 hours of the day, the size of storage would be enormous. A cubic foot of bark will make about 50 pounds of steam, so that at capacity on bark (130 M lb./hr.) the fuel volume is 2600 cfh. Bark tends to bridge and removal from storage, particularly when it has been allowed to settle for a period and pack, presents problems even

when using "live-bottom" bins. Therefore, in this case a storage of only about 20 minute capacity is provided, to permit evening out and gradual change of bark feed, and the bark is supplemented with gas.

Auxiliary Equipment

Oil pumps and heater, instrument air compressors and receiver, and Hankison Condensifilters are on the ground floor under the operating aisle. A United Conveyor sluicing system to handle ashes from both the old bark-burning boilers and the new unit is in a trench in this floor.

The ash is sluiced to a low region adjacent to the plant, adequate for many years to come by extension of the sluice pipe.

The existing feedwater treating and pumping is adequate to handle the new requirements, so no new facilities are provided. Feedwater lines come from the existing header, and steam connections are to existing headers.

Electrical distribution is from a vault on a mezzanine of the ground floor, immediately below the operating floor.

Building

The building is of the semi-outdoor type, with 8 ft. 6 in. louvers projecting 6 ft. on 8 ft. vertical spacing. Concrete floors are provided in the operating areas, grating floors at the sides and rear of the boiler. A corner stairwell is provided from top to bottom, with access at all levels to the adjacent old boiler house. A hoisting well with removable grating at each level has a 3-ton hoist at the top. The roof is of precast concrete slab construction, with built-up roofing. A hatch in it permits renewal of air preheater tubes.

WET BLASTING

WITH scores of plant equipment parts requiring periodic cleaning, plant engineers have had reason to look for mechanical methods of accomplishment. Parts like oil burners for furnaces, and pistons, valves, and rods for plant engines need to be freed of carbonaceous scale, rust, and other surface contaminants to avoid plugging up.

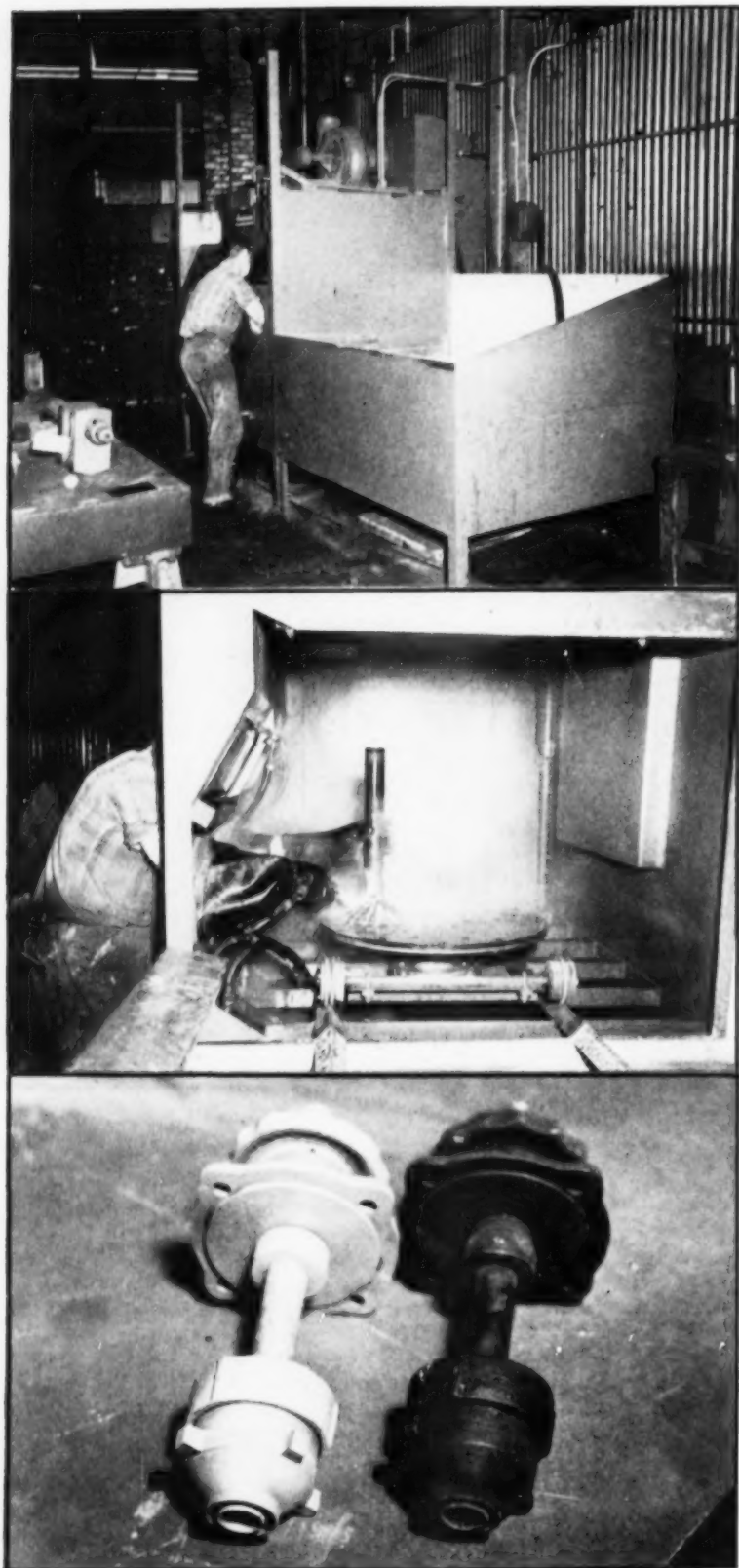
In an effort to decrease maintenance costs and speed up processes, many engineers have turned to the wet blasting process. This process consists of throwing water-suspended abrasives at the work by compressed air, and as such, is particularly appropriate for cleaning problems where holes, pockets, and other recesses make it difficult to reach the contaminants and remove them. Cleaning is rapidly accomplished, and all areas on a part receive the same uniform finish. Surface abrasion is easily controlled, since such fine-mesh abrasives are used.

The accompanying illustrations show parts being cleaned with a Liquamette wet blasting machine manufactured by American Wheelabrator & Equipment Corp.

UPPER— Workman operating wet blasting machine for reconditioning plant equipment. Section of machine at right is rinse tank.

CENTER—A typical reconditioning job is removing scale from oil burner parts for the boilers. This part was descaled in 10 minutes with 140 mesh abrasive.

BOTTOM—The oil burner part at the right is as removed from service, oily and scale-coated. Compare it with the part at the left which has been wet blasted for only 10 minutes.



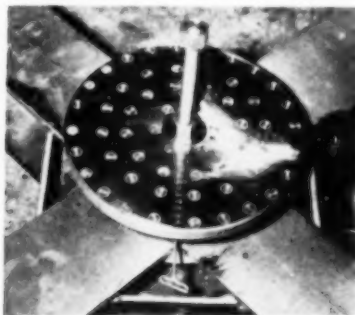
Magnets Position Parts for Welding

SEVERAL fabricating plants have checked into the possibilities of using permanent magnets to position components for welding. They can form the simplest holding device that can be used.

One of American Blower Corporation's plants has found the magnets a time saver in its production operations, since the use of the magnets contributed to the accuracy of the assembly work.

Welding vane assembly of fans up to 7 ft in diameter may produce a very unbalanced fan if there is any movement of parts during the operation. This problem seemed to revolve around the vane hub, so American Blower jig and fixture men attacked the crux of the matter with permanent magnets.

Mounting a 16-in. circular steel plate at the center of crossed I-beams, they drilled the plate for fifty-eight 11/16 in. diameter permanent magnets.



Hub plate of fan or vane welding jig shows permanent magnet poles at surface, insulated from the plate by thin-wall aluminum tubing. Magnets hold vane securely for welding.

The magnets, manufactured by Carboly Department of General Electric Company of the highest energy material commercially available, were installed in the plate and insulated from it by thin-wall aluminum tubing and washers.

The vane hub holds rigidly when placed on the plate, while blades are welded in between hub and outer ring. The fixture takes work up to 82 3/4 in. in diameter, without any movement in vane blades, hub or outer ring.

**Fabricated
Concrete Reinforcing
Steel Bars**

DIXISTEEL
TRADE MARK

**Welded Wire Mesh
and Accessories**

- QUICK, ACCURATE ESTIMATES
- COMPETENT ENGINEERING AID —
DETAILING AND BILLS OF MATERIAL
- RAPID, DEPENDABLE SERVICE
- COMPLETE, ADEQUATE STOCKS

Contractors and builders are finding Atlantic Steel's Fabricating Division an excellent source for mill-fabricated steel concrete reinforcing bars, welded wire mesh and accessories. They're priced right, delivered on time, and meet Dixisteel's standards for high quality.

We'll welcome the opportunity to work with you on your next job. Just call, wire, or write and one of our representatives will get in touch with you.

**WELDED WIRE MESH
and ACCESSORIES**

•

**REINFORCING BAR
FABRICATION**

•

FORGINGS and STAMPINGS

•

HOT-DIP GALVANIZING

•

HEAT-TREATING

FABRICATING DIVISION

**Atlantic Steel
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UPSETTING • TRIMMING • THREADING
PUNCHING • HOT-BENDING • DESCALING
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Equipment..Supplies..Methods

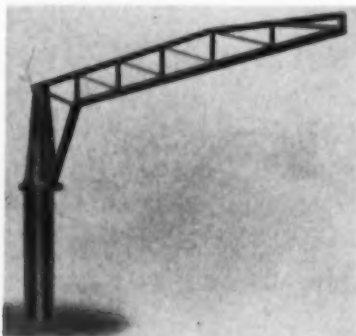
FOR FREE INFORMATION—Circle code number on pages 16 & 17

Full-Rotating Jib Cranes

J-1 R. G. LETOURNEAU, INC., Longview, Tex., announces the production of new heavy duty jib cranes.

The cranes are self-supporting, pillar-type and are designed for heavy manufacturing and materials handling operations indoors or outdoors. Ease of operation while under load is provided by a roller bearing ring, ball joint and ball thrust socket built into the top of the support pillar.

The span of the jib cranes is 25 feet, permitting up to 1,986 square feet of floor area to be served. The 14½-foot vertical clearance of the jib provides room for handling bulky or tall objects.



LeTourneau jib cranes available in 6 and 15-ton capacities.

The independent, concrete-embedded foundations occupy only five square feet of floor area. The cranes may be installed at any location desired, permitting operation between building columns without interference. They are of particular value when located where they will work with overhead cranes or free the larger crane for other work.

LeTourneau Jib Cranes are available with or without electric hoists. The hoists may be operated from shoe-type collectors on trolley wires installed on the boom, or they may receive power from a rubber-covered messenger cable. A slip-ring electrical contact is optional equipment for the cranes to provide positive power connections under all revolving conditions.

Roof "Fire Valve"

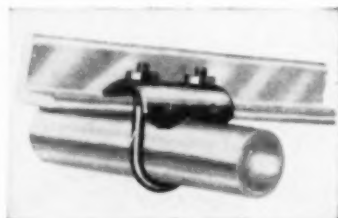
J-2 THE SWARTWOUT COMPANY, P. O. Box 2468, Cleveland 12, Ohio, has developed a roof unit for industrial buildings which opens quickly when excess interior heat occurs, thereby releasing heat, gases, and smoke in the event of fire.



Each unit of the Fire Valve provides 46 sq ft of free area opening when two large dampers drop, released by a fusible link device. Dampers can also be opened and closed by a loop chain when desirable to use the unit for extra ventilation in good weather. The unit is weatherproof when closed. Any number of fire valves can be installed on a roof to meet recommendations of fire and insurance authorities.

Right Angle Pipe Support

J-3 SPEDON PIPE CLAMP CO., 33-51 60th Place, Woodside 77, N. Y., has introduced the new right angle Ubolet type X Spedon pipe support, designed for use with standard pipe or rigid steel conduit for mounting on structural flanges up to ¾" thick.



Offset biting edges provide firm self-equalizing pressure. Available in ¾" to 2" pipe sizes.

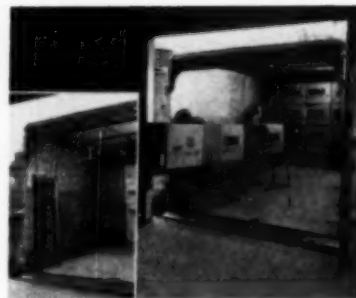
The body is made of heavy gauge pressed steel and hardened by the manufacturer's special Ramodized

process combines an unusually hard and corrosion resistant surface with flexible inner core. Sharp biting edges at the corners are further apart than the U-Bolt legs and provide self-equalizing bite pressure and better stability.

Unlike supports of the set screw type which cannot maintain even pressure under thermal variations, the Ubolet retains a constantly effective clamping tension in the U-Bolts provided by the saddle spring action. This feature makes this pipe support ideal for heavy-duty industrial applications.

Telescoping Wheel Conveyor

J-4 ASSOCIATED METAL FABRICATORS, DIVISION OF JERSEY SHEET METAL PRODUCTS, INC., 18-20 Sebago St., Clifton, N. J., have developed a new, portable telescoping wheel conveyor that opens to any length between minimum and maximum spread with no drop in conveyor level.



Unit, which telescopes down to 4'4" extends up to 10'2".

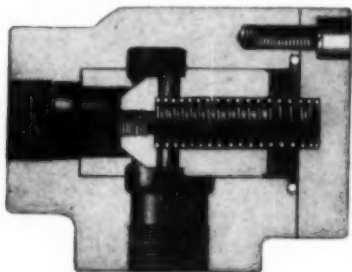
The new conveyor can be used in multiple units or attached on existing conveyor line. It is used within plants to increase the efficiency of product flow, particularly to simplify aisle cross-overs. Loading and unloading operations are also speeded with "Tel-O-Veyor," and it may be carried inside a truck without loss of payload space.

For more data circle item code number on the postage free post card—p. 17

(Continued on page 96)

Hydraulic Check Valve

J-14 RIVETT LATHE & GRINDER, INC., Boston, Mass., has introduced the 3000 psi valve, which allows free flow in one direction and prevents flow in opposite direction.

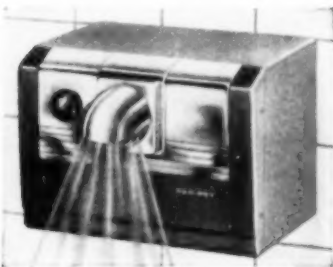


The new valve features large area which permits unusually large volume. For example, the 1½" valve has a 104.2 gpm capacity at 15 ft per sec.

The valves may be secured with pipe thread or flange connection; spring closed or pilot operated; in ¼" to 1½" size; mounting may be made in any position.

Hand-and-Face Dryer

J-15 MICHAEL ELECTRIC COMPANY, INC., 15 Stiles St., New Haven, Conn., is offering a new high speed, low cost electric hand-and-face dryer with germicidal action.



More and more organizations are employing electric hand dryers in their restrooms in order to eliminate janitorial services, laundry or paper towel supply expense, and towel storage and disposal costs. Ozo-Dry Hurricane, equipped with Westinghouse Odorout Sterilamp, provides a simultaneous drying and sterilizing operation. Indirect ultraviolet irradiation generated by the sterilamp prevents the spread of surface bacteria, and checks skin irritations caused by manufacturing operations requiring constant work with water, alkaline or chemical solutions. Unit is priced at \$79.95.

Good Chimney Repair Is Like Money In The Bank



A planned program of repair and inspection means profits for you

Like money in the bank—that's what a chimney in good repair can mean to you. As it is one of the most expensive and most important parts of the equipment of your plant, your factory chimney should have constant and careful attention.

Whether your chimney is of brick, steel, or concrete, its maintenance should not be neglected. If ignored, and allowed to become cracked and corroded, industrial chimneys can easily become operating liabilities and threats to safety.

Make sure you are not losing money by neglect of your chimney. A system of planned inspection and repair can be like money in the bank for you.

Turn to the expert engineers and inspectors of Custodis. Throughout the United States and Canada they are constantly solving chimney problems. The list of satisfied customers of Custodis, built over fifty-one years of service, includes most of the progressive industrial organizations on this continent.

Any job, large or small, receives our careful attention and the benefits of our long experience, sound engineering, expert supervision and skillful workmanship.



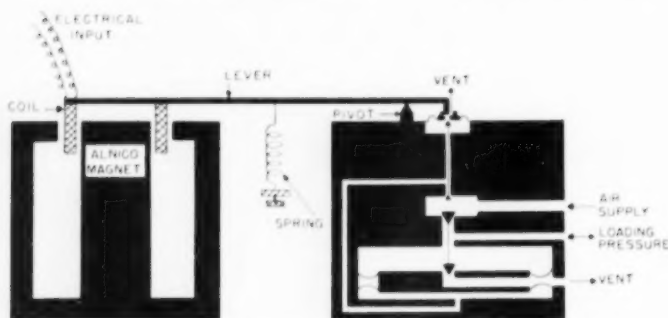
USTODIS CONSTRUCTION COMPANY, INC.

■ ATLANTA
806 Henry Grady Bldg.
WA 1183

■ NEW YORK
157 Chambers St.
DI 9-3944

■ CHICAGO
22 West Monroe St.
RA 4-3614

Equipment . . Supplies . . Methods (Continued)



Schematic diagram of Swartwout's power relay

Power Relay Eliminates System Transmission Lags

J-5

THE SWARTWOUT COMPANY, 18511 Euclid Ave., Cleveland 12, Ohio, announces a new power relay which eliminates transmission lags common to pneumatic systems.

The Autronic Type P2R Power Relay is an electro-pneumatic transducer designed to operate with the Swartwout Autronic Control System. It takes the electrical output from the Autronic Controller or Manual Control and converts it to an air-loading pressure proportional to the electric current. This makes it possible to utilize the low cost and flexibility of air operated valves without the transmission lags normally encountered in all-pneumatic systems. No electric motors, boosters or slide wires are employed. The equipment can be made explosion proof, if desired.

Process variables are converted into a small a-c voltage by the primary element transmitter and acted upon by a selective wide range of control actions in the Autronic Controller. D-c output of the controller, which is transmitted to the power relay, is of a value which is fundamentally governed by the primary element transmitter, but which is continuously modulated by the proportional, reset and rate-time actions of the controller. Large mechanical power amplification at the final control element is obtained by the power relay.

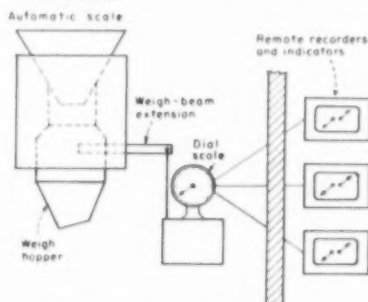
The relay operates on the null-balance principle in which a magnetic force is balanced against the force produced by the air-output pressure from the pneumatic pilot. The electrical side of the relay consists of a moving coil in a permanent-magnet field, and is adjusted so that a 4 milli-

ampere current gives an air-loading pressure of 3 psi, and an 8 milliamperere current produces a 15 psi output with a direct-acting power relay. Other higher air-pressure ranges are available. The unit can be used either reverse or direct acting.

Remote Indicating & Recording System

J-6

RICHARDSON SCALE CO., Clifton, N. J., announces the development of remote indicators & recorders that have standard accuracies of one part in 2000; higher accuracies are available, if desired.



Designed originally for weight control, these remote units precisely follow a prime-mover dial scale. In operation, the weight of material fed to the automatic scale's weigh hopper is indicated on the dial scale. These readings are synchronized and duplicated on an indicator in any chosen remote location.

Remote recordings may be made either on circular charts, strip units or tape printers. Remote indicating and recording units may be hooked up

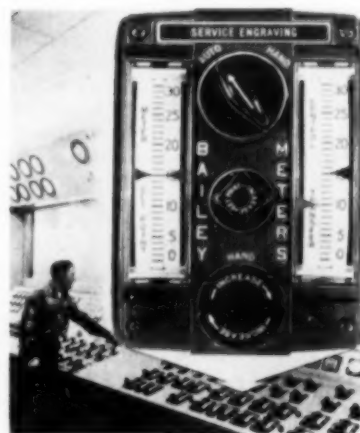
to any industrial-make scale dial, and any number of units may be run by the one prime-mover.

Heart of the instrumentation is a 60-cycle servo system, consisting of a synchro transmitter, amplifier and a servo mechanism made up of a servo motor and control transformer.

Single Station Simplifies Pneumatic Control Supv.

J-7

BAILEY METER COMPANY, 1050 Ivanhoe Road, Cleveland 10, Ohio, is offering a new device by which vital operating indications and control for pneumatic control systems are now concentrated in a single control station.



The Bailey MINI-LINE Control Station provides a complete picture of control system performance and full flexibility of remote control. An operator has the choice of remote manual control independent of all automatic controllers for starting and stopping the process and for periods where the measuring and/or controlling elements may be out of service. Quick transfer from automatic to hand may be made without any disturbance to the process.

Vertical gages indicate signals from the transmitter, set point or bias, hand control, and automatic control. The three control knobs are for automatic-hand selection, set point or bias adjustment, and hand control.

This unit operates on standard SAMA signal ranges of 3-15 or 3-27 psig. Control desk flush mounting uses an area only 6¼" x 4½". Gage accuracy is within ±¼% of signal range, and air consumption is less than 0.2 cfm.

FOR FREE INFORMATION—Circle code number on pages 16 & 17

Self-Contained Boilers

J-8

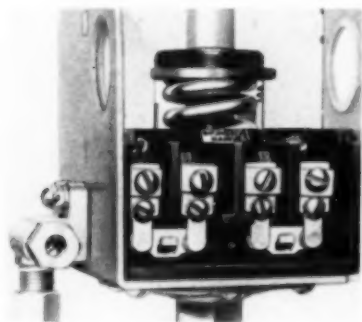
THE CLEAVER-BROOKS COMPANY, 326 E. Keefe Ave., Milwaukee, Wis., announces the extension of its new line of boilers to include units of 50, 60, 70 and 80 boiler horsepower capacity.

Among the major features are silent operation, with remarkably low decibel ratings; full modulating burner; models available to handle all grades of fuel oil, light distillate No. 2 to No. 6 or Bunker C; more efficient oil-pre-heating equipment attached to the boiler base frame; a new silent oil pump using a gear head motor which eliminates pump operational noise; and Fireye electric combustion safety control.

Heavy Duty Pressure Switch

J-9

CUTLER-HAMMER, INC., 305 N. 12th St., Milwaukee, Wis., is offering a new pressure switch designed specifically for heavy duty applications such as air compressors and water pumps over 1 hp.



All the parts which have bearing surfaces are made entirely of stainless steel. All other operating parts are either of a non-corrosive material or are plated steel. The diaphragm is made of nylon reinforced neoprene. Special silver alloy contacts, which are highly resistant to welding, never need filing or cleaning. Compartment isolation of the electrical unit from the mechanical unit assures trouble free operation.

"Straight through" wiring is offered by conduit openings on each side of the case for a 1/2 or 3/4 inch conduit, and space inside the case allows ease of securing conduit to case.

The operating range and differential are set at the factory according to users' specifications. However, the range can be adjusted with an ordinary screw driver, and the differential can be adjusted with a small wrench.

FOR 33 YEARS...

DUM DUM MASONOC

PROTECTS MASONRY

KEEPS OUT HURRICANE-DRIVEN RAINS

Since 1913 Dum Dum Masonoc has protected the off-street walls of this famous Mobile, Ala., hotel. For 33 years the original application of this thick, tough skinned coating kept hurricane-driven rains from penetrating . . . ruining interiors. Not until 1946 was it advisable to apply another coat of Masonoc.

GET THIS LONG-LIFE PROTECTION FOR YOUR BUILDINGS!



The Dum Dum Masonoc System, an Arco exclusive, is the most durable masonry protection you can buy . . . for grain elevators, industrial and commercial buildings . . . or hotels. Sprayed by approved applicators, Dum Dum Masonoc protects against weather, fumes, acids, alkalis and moisture. Ten times thicker than paint, it expands and contracts, bridges fine cracks . . . has a skin that heals itself . . . seals if cut or gouged, yet stays pliable underneath.

Dum Dum Masonoc is one of an impressive group of Arco quality coatings that add life and value to your buildings and reduces per-year maintenance cost. Stack Dum Dum, Arcopel Rubberized Masonry Paint, and Arroc Silicone Transparent Water Repellent are also available for specialized maintenance problems.

And remember . . . there are Arco Maintenance Paints for every maintenance need . . . from flagpole to boiler room!

THE ARCO COMPANY

7301 Bessomer Avenue • Cleveland 27, Ohio

ARCO COMPANY OF CALIFORNIA, LTD.

745 E. 59th Street • Los Angeles 1, California

A Subsidiary of American Marietta Company



☐ Send booklet on Arco Dum Dum Masonoc.

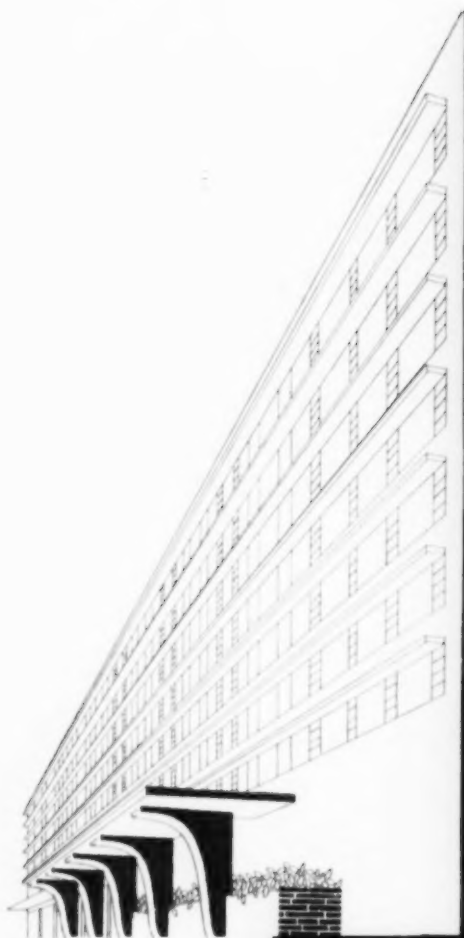
☐ Send specification bulletins on 83 Arco Maintenance Paints.

Name _____

Company _____

Address _____

City _____ State _____



it's
— — — — —
quality-controlled
CW steel pipe

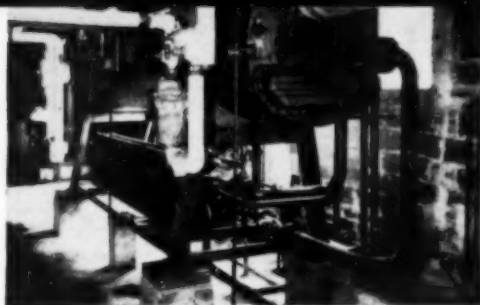
in this new apartment

Modern living and year-round comfort for tenants is the theme at the new Paces Ferry Tower Apartments in Atlanta, Georgia. This apartment hotel, one of the finest and most modern in the Atlanta area, contains 202 completely air-conditioned living units, in addition to convenient shops and a restaurant located on the first floor.

In every phase of design and construction, all materials were selected with extra care. That's why Spang CW Steel Pipe was used exclusively in the air conditioning system. And there's a good reason. The steel for manufacturing Spang CW Steel Pipe is carefully selected for special characteristics . . . strict metallurgical control is maintained during forming . . . and the finished pipe is thoroughly inspected to assure you of a perfect product.

This explains why Spang CW Steel Pipe is just right for easy forming, welding, cutting, bending, and threading . . . features that speed installation and reduce costs for you.

Don't take pipe that will "just do" . . . insist on Quality Controlled Spang CW Steel Pipe. Ask your distributor, he'll tell you why Spang is the best.



Owner: Paces Ferry Tower, Inc., Atlanta, Georgia

Architect: J. C. Wise, Atlanta, Georgia

General Contractor: Mion Construction Co., Atlanta, Georgia

Piping Contractor: Stephenson Company, Inc., Atlanta, Georgia

Distributor: Cowan Supply Co., Atlanta, Georgia



SPANG-CHALFANT

DIVISION OF THE NATIONAL SUPPLY COMPANY

General Sales Office: Two Gateway Center, Pittsburgh, Pennsylvania. District Sales Offices: Atlanta, Boston, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis.

new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

Overload Protection For Machine Drives

MORSE CHAIN COMPANY, 7601 Central Ave., Detroit 10, Mich., is offering adjustable torque limiter-coupling units combining the features of an adjustable slip-clutch overload device with those of a flexible coupling.



Morse No. 5 Torque Limiter-coupling unit provides overload protection for a wide variety of machine drives with direct-connected shafts.

These compact units are ideally adapted to motor drives with torque loads up to 260 ft lb which include a direct-coupled motor or motor and speed reducer combination. In drives of this type the torque limiter-coupling unit connects the motor shaft or the output shaft of the speed reducer with the primary drive shaft.

A flat molded friction disk with three integral lugs is clamped between two steel driving plates by the action of a Bellville spring tensioned by an adjusting nut. The driving plates are splined to a steel hub. The hub supporting the torque limiter components is keyed to the shaft.

Flexible coupling action is achieved by meshing the lugs on the OD of the disk with a slotted steel cup which is keyed to the shaft. This slotted lug and cup combination permits the units to function properly.

When machine drive overload conditions cause the torque setting of the torque limiter to be exceeded, the friction disk breaks away from the driving plates and will then slip at from $\frac{1}{3}$ to $\frac{1}{2}$ the torque setting. Thus the drive is rendered inoperative, protecting motor, machine and drive components from overload until the motor is shut off and the overload condition corrected.

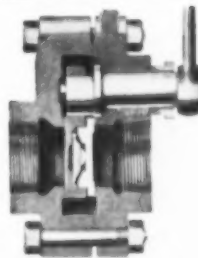
EVERLASTING VALVES

Mean "Everlasting" Protection
on these duties



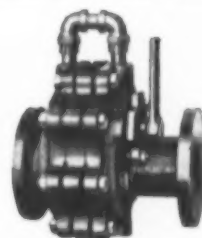
BOILER BLOW-OFF

Quick-opening, also hand-wheel operated. Angle and "Y" types and combination units meeting ASME Code requirements for pressures up to 600 psi.



GENERAL SERVICE

Wherever frequent use and quick operation is required for any liquid or gas at pressures up to 300 psi. These valves have outside stuffing box and gland.



STEAM JACKETED

Assure continued free flow of any material which congeals at ordinary temperatures.



EMERGENCY PROTECTION

Closing type for inflammable liquid emergency shut-off, or opening type for deluge or drainage, assuring immediate and positive action with weighted pendulum stop.



CYLINDER-OPERATED VALVE

for accurate control of process work. Straight-through flow, drop-tight seal, air or hydraulic control for operation at any speed.

EVERLASTING FEATURES

For more than 40 years, EVERLASTING VALVES have been known for their ingenious design, simple, sturdy construction, and long trouble-free life with low maintenance expense. Some of their distinctive features are:

Quick-Action . . . Opened or closed with less than a quarter turn of the operating lever.

Straight-Through Flow . . . the disc cannot become loose and accidentally check the flow.

Drop-Tight Seal . . . constant contact of disc and seat at all times prevents dirt or scale from getting between.

Self Regrinding . . . the disc rotates on the seat with each operation, thus regrinding the sealing surfaces.

No Wedge Action . . . all parts move between parallel faces.

Write for bulletin describing EVERLASTING VALVES in detail.

EVERLASTING VALVE COMPANY 53 Fisk Street, Jersey City 5, N. J.

Everlasting Valves

TRADE MARK EVERLASTING REG. U.S. PAT. OFF.

EV 381

for everlasting protection

Equipment . . Supplies . . Methods (Continued)

Quenching Oils Offer Increased Cooling Power

J-11 SINCLAIR REFINING COMPANY, 600 Fifth Avenue, New York, N. Y., has developed a new series of quenching oils designed to produce better metal products more economically.

The new oils, known as the Sinclair Quenchol 500 Series, embody a new

concept in metal cooling. They offer greatly increased cooling power to assure a higher, more uniform degree of metal hardness as well as greater depth of hardness.

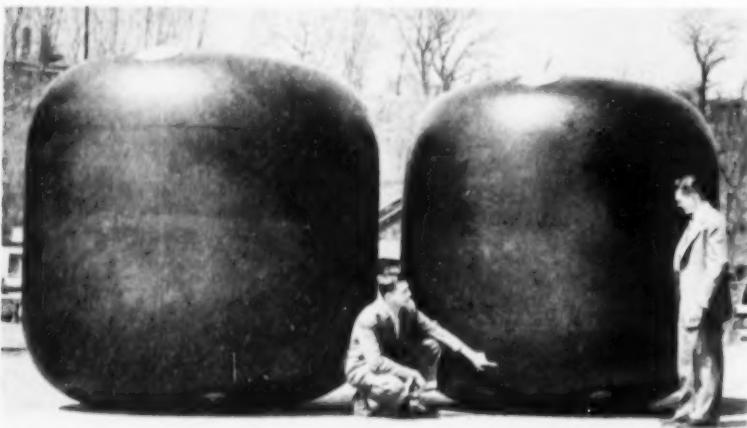
Heat dissipation of quenched metals is closely controlled by the Quenchol 500 Oils to prevent cracking, pitting, distortion or warpage of product. Performance tests indicate the new oils will produce substantial reduction of

piece rejection rates and will enable metalworking plants to utilize lower cost steels for critical purposes.

Other features are minimum oil evaporation and drag-off, together with prolonged service life due to high resistance to deterioration and breakdown.

While developing the new oils, Sinclair technicians used a new practical instrument for quickly and simply measuring the capacity of any quenching oil to rapidly cool steel. The difficulty of rating heat transfer ability had been a major deterrent to the development of effective quenching oils. The new Sinclair Quenchol Demonstrator, a portable laboratory instrument, utilizes a hot wire test to accurately measure the cooling effectiveness of quenching liquids.

Comparative demonstrations of Quenchol's high cooling power may be arranged through the Technical Service Division of Sinclair Refining Company, 600 Fifth Avenue, New York.



Rubber-Fabric Containers Handle Bulk Shipments

J-12 UNITED STATES RUBBER COMPANY, Rockefeller Center, New York 20, N. Y., has developed 500 gallon and 2500 gallon synthetic rubber and fabric containers for handling bulk shipments of granular and powdery materials.

The containers which can be collapsed after emptying for return and re-use, are being used for bulk shipment of chemicals, such as polyethylene and polyvinyl chloride, and are being widely tested for bulk shipment of carbon black, starch, clay, flour, sugar, malt, and many corrosive and hygroscopic materials.

The containers enable manufacturers to make a three-way saving. They reduce handling and packaging costs at the point of origin; permit low-cost bulk shipment, and simplify receiving and handling by the user.

Arrangements are now being made for manufacturers to lease the containers at a monthly rate if desired.

The 370 cu ft or 2500 gallon container is 8 ft in diameter and 8 ft high. Air or gas can be pumped into the filled container to provide addi-

tional rigidity during handling. Collapsed for storage or return shipment, it is 8 ft long, 8 ft wide and 2 ft high.

Containers can be shipped by barge, rail or truck. They can be stored outdoors or indoors at point of origin, in transit or at destination by the user. They are tough, non-corrosive, vermin-proof, leak-proof, weather-proof and are practical to fill, empty and clean.

The containers are built like a tire with a number of plies of high strength cord fabric and synthetic rubber molded into one piece. Extra plies are used at points of greater stress. They are internally reinforced by several strong, flexible lifting cables, which are attached to a single lifting ring at the top of the container. The rugged, resilient construction enables the containers to withstand continued hard service without damage to themselves or loss of contents.

The exterior of the containers and the inner lining are neoprene rubber, providing high resistance to aging, weathering, abrasion and contact with oils and corrosive chemicals. The containers have a six-inch closure in each end for ease of emptying and filling.

Two-Wheel Hand Truck With Hydraulic Lift

J-13 PRECISION EQUIPMENT CO., 3714 N. Milwaukee Ave., Chicago 41, Ill., announces production of the "Shop Caddy," a rugged two-wheel hand truck which embodies a hydraulic lift capable of raising loads of as much as a quarter ton.

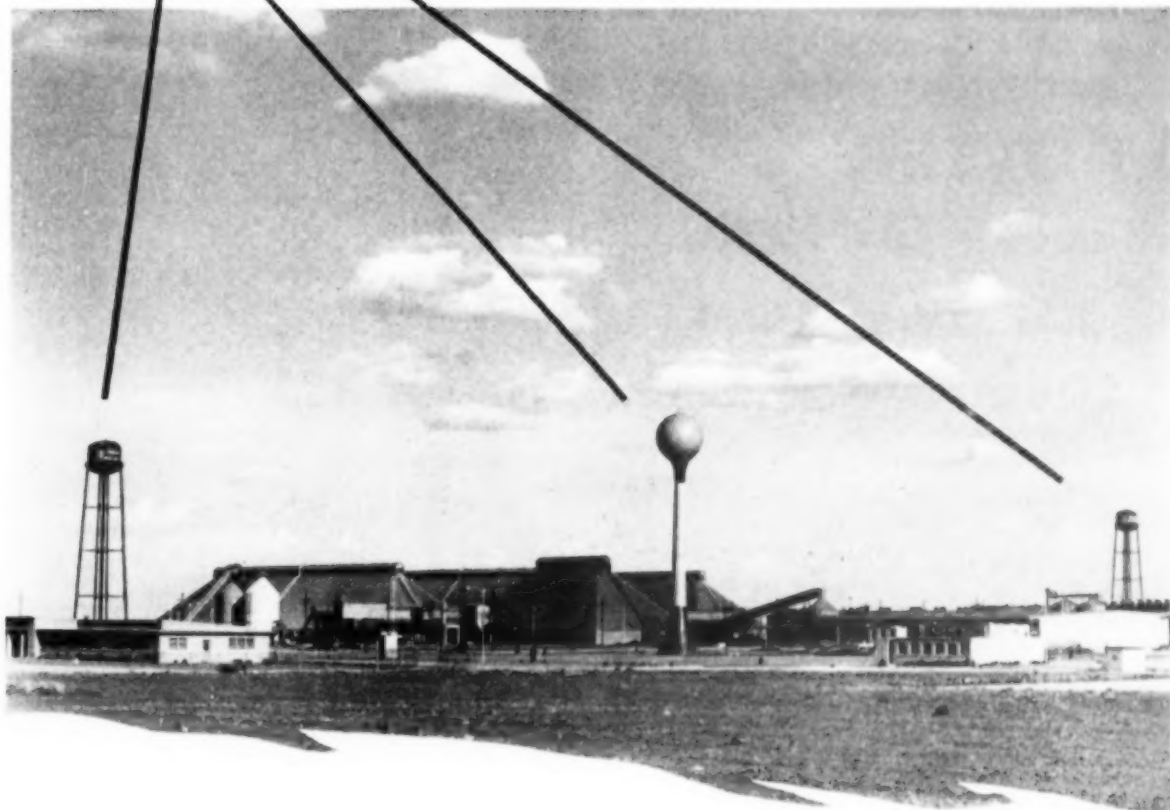


The Shop Caddy is useful for loading and unloading trucks, for stacking kegs and boxes, for moving dies and for moving heavy units in assembly line production. The lifting platform, in down position, is at floor level for easy loading. When loaded, a few strokes of the lever will raise the load to the proper height. A four-speed pump ram is furnished as standard equipment so that the lifting speed may be set according to the load.

Lift capacity is 500 lb and lifting height is 36". Platform is 16" long x 20" wide. Overall height is 50" and overall width is 23". The roller bearing wheels are of 8" Moldon Rubber.

3

REASONS for good water service at this Texas Plant



Shown through the eyes of a camera are two 100,000-gallon Horton® elevated water tanks and a 50,000-gallon Watersphere® recently erected for Western Cotton Oil Company at Lubbock, Texas. The elevated tanks are of ellipsoidal-bottom design and are 140 feet to bottom. The streamlined Watersphere is 100 feet to bottom.

Often, one Horton elevated tank of the proper size will handle all the water needs in a private or municipal water system. Sometimes, however, greater efficiency is obtained by the proper dispersal of more than one structure.

Write our nearest office for estimates or quotations on elevated tanks, Waterspheres or standpipes. Our engineers will be happy to give you estimates or quotations for improving your water system.

Two 100,000-gallon Horton elevated tanks and a 50,000-gallon Watersphere at the Western Cotton Oil Company, Lubbock, Texas.

CHICAGO BRIDGE & IRON COMPANY

Atlanta 3.....2180 Healey Bldg.
Birmingham 1.....1531 North Fiftieth St.
Boston 10.....1044—201 Devonshire St.
Chicago 4.....2107 McCormick Bldg.
Cleveland 15.....2218 Midland Bldg.

Detroit 26.....1534 Lafayette Bldg.
Houston 2.....2132 C & I Life Bldg.
Los Angeles 17.....1545 General Petroleum Bldg.
New York 6.....3312—165 Broadway Bldg.
Philadelphia 3.....1646—1700 Walnut St. Bldg.

Pittsburgh 19.....3252 Alcoa Bldg.
Salt Lake City 4.....545 W. 17th South St.
San Francisco 4.....1531—200 Bush St.
Seattle 1.....1345 Henry Bldg.
Tulsa 3.....1628 Hunt Bldg.

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE, PA.

In Canada—HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

News for the South and Southwest (continued)

(News starts on page 8)

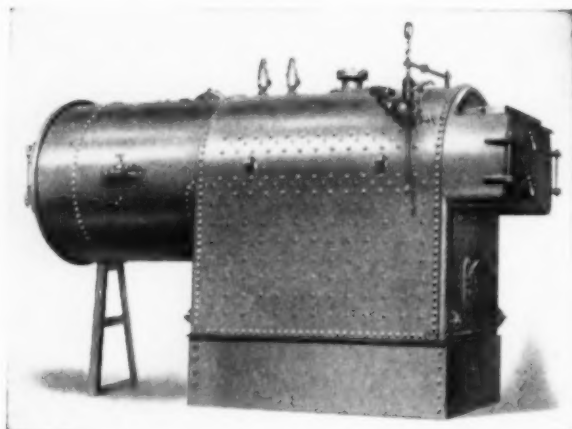
New Kansas City Plant

Steel erection has been completed and processing equipment is being installed for the chemical plant under construction on a six-acre tract in the Fairfax industrial area of Kansas City, Kansas, for the PERMATAX COMPANY, INC., Brooklyn, N. Y., producers of sealing compounds and maintenance

chemicals for the transportation and other industries.

The new plant was designed and is being constructed by Walter Kidde Constructors, Inc. It will consist of a 160 ft by 160 ft structure with a one-story office section, two-story manufacturing and packaging section and a warehouse section with a 19 ft clear height.

POWER with POWER to spare



A NEW DOUBLE PASS ALL-PURPOSE INDUSTRIAL AND HEATING BOILER

SOUTHERN MADE FOR SOUTHERN TRADE

Made in sizes from 44 H.P. to 153 H.P. S.B.L. rating with pressure to 150 lbs. Designed for coal, gas or oil firing, the New Lucey Double Pass Boiler can be furnished complete as a package unit.

This boiler is in addition to our regular line of single pass fire box boilers which we have been making since 1918.

WRITE FOR BULLETIN NO. 153 FOR COMPLETE SPECIFICATIONS

LUCEY BOILER AND MANUFACTURING CORPORATION

CHATTANOOGA,
1514 CHESTNUT ST.
CHATTANOOGA

TENNESSEE
1312 STERLING BLDG.
HOUSTON, TEXAS

Manufacturing equipment will include jacketed mixing vessels with agitators, paste mixers, rotary vacuum fillers, viscous fillers, rotary cappers, can sealers, labeling machinery and roller and belt conveyors. The mixing tanks will be set into the operating floor to permit servicing at a comfortable working level. An underground tank farm of 60,000 gallon capacity will be provided for the storage of raw materials.

Rockwell Promotions—Texas

JACK H. WALTERS, Houston district sales manager of ROCKWELL MANUFACTURING COMPANY's Meter and Valve Division since 1951, has been named gas products manager for the entire division and will make his headquarters at the company's home office in Pittsburgh.



Thomas I. Stacy

THOMAS I. STACY will replace Mr. Walters as district manager. Mr. Stacy joined Rockwell in 1938 after graduating from Oklahoma A&M College with a B.S. degree in mechanical engineering. After spending two years as a shop worker and serviceman at Rockwell's Instrument Division plant at Tulsa, Okla., he was promoted to sales engineer in the Houston district.

Sterling Electric Motors Distributors—Fla., Mo.

STERLING ELECTRIC MOTORS, INC., has announced the appointment of the following distributors for their line of electric power drives: GENERAL ENGINEERING CO., 339 Park St., JACKSONVILLE, FLORIDA; BECKLEAN COMPANY, 1316 Oak Street, KANSAS CITY, MISSOURI; ZELLER ELECTRIC COMPANY, 4039 Gravois Ave., ST. LOUIS, MISSOURI; and PENINSULAR ARMATURE WORKS, 151 N. W. 24th St., MIAMI, FLORIDA.

Minneapolis-Honeywell Forms Greensboro, N. C., District

MINNEAPOLIS - HONEYWELL REGULATOR COMPANY has announced the creation of a new district managership at GREENSBORO, N. C. The position is filled by DONALD H. HANNASCH, formerly resident salesman for the company at Rochester, Minn. The office formerly was under the direct supervision of the Charlotte office.

The company also announced that MERRITT EUSEY, former head of the Baltimore branch, has been named to head the Pittsburgh office. He has been succeeded by ROBERT S. WARNICK as branch manager in BALTIMORE.

Swan Manages Reynolds Plant

VERNON SWAN, for the past 3½ years Ingot Products Supervisor at REYNOLDS METALS COMPANY'S sales headquarters, LOUISVILLE, KENTUCKY, has been made manager of the firm's Plant 5, located on Camp Ground Road, Louisville. The facility produces general purpose aluminum alloy ingot for use in foundries.

Mr. Swan was graduated from the University of Wisconsin with a B.S. degree in chemical engineering. From 1945 through 1950, he was employed by National Pressure Cooker Company as supervisor of both permanent mold and die casting operations, and prior to that time served as foundry metallurgist at aluminum and magnesium sand foundries operated by Wright Aeronautical Corporation. He joined Reynolds in 1950 as foundry consultant.

Okonite Expands—Alabama

THE OKONITE COMPANY, electrical wire and cable manufacturer of Passaic, N. J., has authorized construction of a modern warehouse and sales office at 31st Street South and Avenue G in BIRMINGHAM, ALABAMA. DEWEY A. WHITE, District Manager, will be in charge of this operation.

These new air-conditioned facilities will complement the company's other warehouses in Chicago and Los Angeles, as well as the factory stocks at the company's three plants in Pennsylvania and New Jersey.

Cooperating in plans for the warehouse were the local Committee of 100; Pembleton & Mims, architects; and J. H. West & Sons, general contractors. Negotiations were handled by J. B. Grimmer of Molton, Allen & Williams.

COME
TO
PHILADELPHIA

**Dec.
2-3-4-6-7
1954**

21st NATIONAL POWER SHOW

**NATIONAL EXPOSITION OF
POWER AND MECHANICAL ENGINEERING**

COMMERCIAL MUSEUM — PHILADELPHIA

LEARN HOW YOU CAN MODERNIZE POWER FACILITIES

Concentrated under one roof you will see the newest improvements and refinements in power generation, transmission, utilization. Learn how these methods will help to modernize your power facilities—

The latest techniques for the maximum development and most economical utilization of power will be demonstrated by the skilled technicians manning every booth. Whether you are interested in mechanical, steam, electrical, hydraulic or pneumatic power, you will be sure to find ideas that will repay you many times over.

When going to the A.S.M.E. meetings, be sure to plan a stop-over at Philadelphia to see the Power Show.

PLAN NOW TO ATTEND

Write early for hotel reservations and advance registration

Under the auspices of the ASME

Management: International Exposition Co.

480 Lexington Avenue, New York 17, N. Y.

News for the South and Southwest (continued)



Harry L. Teal

Clark Equipment—Virginia

HIGHWAY MACHINERY & SUPPLY COMPANY, INC., 1724 Altamont Avenue, RICHMOND, VA., has been appointed to sell and service the line of fork-lift trucks, straddle carriers and other materials handling equipment manufactured by the Industrial Truck Division of CLARK EQUIPMENT COMPANY in the entire state of Virginia.



George Cole Scott

Highway Machinery & Supply has a branch office at 425 W. Fourth Street, Salem, Va., and a second branch office is now nearing completion in Norfolk, Va. HARRY L. TEAL, president, and GEORGE COLE SCOTT, vice president and sales manager, are partners in the dealership. A. J. MATTA is treasurer, ROGER PITTS is parts manager, WILLIAM REDICK is service manager and DICK CLARKE is general superintendent.

BS&B—St. Louis

BLACK, SIVALLS & BRYSON, INC. TULSA, OKLAHOMA, announces the appointment of INDUSTRIAL PROCESS EQUIPMENT COMPANY 1148 Hornsby St., ST. LOUIS as exclusive representative for Climax Control Equipment in Eastern Missouri and Southern Illinois. The company, under the direction of PETER A. PULEO, has represented BS&B in the sale of Safety Heads and Venting Equipment since September 1, 1953.

Vulcan Steel Container Co. Expansion—Alabama

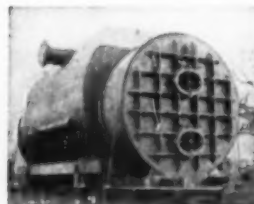
Construction of a large addition to its present building to increase its operation by 30 per cent has been announced for VULCAN STEEL CONTAINER Co. of BIRMINGHAM, ALABAMA, by president, GORDON D. ZUCK.

Vulcan Steel Container Co. is the only plant in the South devoted exclusively to the production of steel pails. The company manufactures a full line of sizes and styles from 1 to 8 gallon, open head and drum type, Hi-bake Lined and Lithographed.



It's just good horse sense

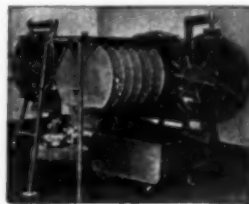
TO FIND OUT WHAT  DEPENDABLE UNITS
CAN SAVE IN YOUR PLANT . . .



CONDENSERS



EVAPORATORS



REFINER FILTERS

Yes, you will be playing it smart when you call CONDENSER SERVICE & ENGINEERING COMPANY and talk over your heat transfer problems. Engineers at CONDENSER SERVICE have worked out the problems of others. You will find the answers to many of your problems in the CONSECO line of condensers, evaporators, closed heaters, deaerators, boilers, steam jet ejectors and refiners and filters.



Condenser Service & Engineering Co., Inc.

HO 3-4425

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N. Y. Tel. BA 7-0600

G.E. X-Ray Dept.—Baltimore

FRANK L. PERRIN, formerly manager of the BALTIMORE District office of the GENERAL ELECTRIC X-Ray Department, has been named manager of the Department's Chicago Office to succeed ROBERT A. MILLS, who is retiring after nearly 48 years of service to G. E.

Mr. Perrin began as a serviceman at San Francisco in 1928, then served as a salesman at Los Angeles and Memphis.



John W. Davidson

JOHN W. DAVIDSON, formerly senior salesman at the Philadelphia office, has been advanced to manager of the Baltimore District Office.

Associated with G-E for 24 years, Davidson started with the company at the Research Laboratory in Schenectady working on special assignments, including the development of the mercury boiler.

Federal Electric Products Appointments—Texas & S.E.

DWIGHT H. LADD has been appointed manager of the DALLAS, TEXAS plant of FEDERAL ELECTRIC PRODUCTS COMPANY and its subsidiary, PACIFIC ELECTRIC MANUFACTURING CORPORATION.

Mr. Ladd, a graduate electrical engineer, has been active in the engineering field for the past twenty-four years.

DANIEL P. LACOCK has been appointed Southeastern Regional Sales Manager for the company in ATLANTA, GEORGIA.

Mr. Lacock will supervise sales of the combined Federal-Pacific line of high and low voltage electrical switchgear, controls, and distribution equipment in North Carolina, South Carolina, Georgia, Florida, Alabama, and parts of Tennessee, Louisiana, and Mississippi.

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Ready to Answer



Your Hurry Call!

Belmont Packings . . . in spool, spiral, ring, reel, coil and sheet form . . . each in a wide range of specially formulated materials to meet the diverse requirements of modern industry.

Once a routine maintenance job, selection and application of packings is now a specialized field requiring experience, dependability and real devotion to service. HOWEVER, THESE REQUIREMENTS NEEDN'T ADD TO YOUR ALREADY HEAVY RESPONSIBILITIES! There's always a Belmont packings distributor to help you anticipate trouble and . . . when emergencies do arise . . . come to your aid.

That's what we mean when we say that Belmont packings are ready to answer your Hurry Call. They're not only made right . . . they're sold right . . . available when you want them, where you want them . . . through a Belmont Distributor . . . dedicated to YOUR service.

WRITE FOR HIS NAME AND ADDRESS

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AIR • ACIDS • ALKALIES • AMMONIA

RINGS • SPIRALS • COILS • REELS
SPOOLS • SHEETS • GASKETS

THERE'S A BELMONT PACKING FOR EVERY SERVICE

News for the South and Southwest (continued)

Goodyear Aircraft—Dallas

Appointment of ROBERT D. PERRY as field representative for GOODYEAR AIRCRAFT CORPORATION in its newly-formed DALLAS, TEXAS, district was announced recently.

Perry's duties call for the solicitation and servicing of accounts with aircraft manufacturers and producers of other aeronautical products in the Dallas area. He will be located at The Goodyear Tire & Rubber Company district headquarters, 3809 Parry Avenue.

Heating & Ventilating Show Returns to Philadelphia

It is announced that the INTERNATIONAL HEATING AND VENTILATING EXPOSITION also known as the air conditioning exposition, will return to Philadelphia, where it was last held in 1951, for the twelfth biennial session, January 24 to 28, 1955.

The show will be sponsored as heretofore, by the American Society

of Heating and Ventilating Engineers, whose sixty-first annual meeting will occur during the same week. Space Reservations already made exceed the total at the last exposition.

The entire facilities of Philadelphia's Commercial Museum and Convention Hall will be utilized, with all of the exhibits on one level. Every phase of heating, ventilating and air conditioning will be covered by exhibits, including commercial, industrial and domestic applications.

The exposition continues under the management of the International Exposition Company, with headquarters at 480 Lexington Avenue, New York.

Commercial Solvents Corp. Promotes James A. Farley

COMMERCIAL SOLVENTS CORPORATION announces that JAMES A. FARLEY has been named Field Sales Manager of the Industrial Chemicals Sales Department, a unit of the Petrochemicals Division.

Mr. Farley has been with the company since 1935. He will make his headquarters at the executive offices at 260 Madison Avenue in New York City.

New Office for Guy Mankin—Atlanta

GUY MANKIN, power and industrial equipment sales engineer, who represents AMERICAN-MARSH PUMPS, INC., L. J. WING MFG. CO., and MANNING & LEWIS ENGINEERING CO., in the ATLANTA area, has recently moved his office out of the downtown district. His new address is P. O. Box 612, Stone-wall, Georgia.

Stanford Elects Sargent

HENRY B. SARGENT, president and general manager of the Arizona Public Service Company, Phoenix, Ariz., is a new member of the Board of Directors of Stanford Research Institute.

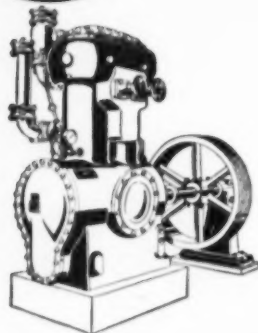
Born in New Orleans, La., Mr. Sargent was graduated from Tulane University in 1927. He has wide experience in the utilities industry.

Below Right: Three of the six Frick refrigerating machines in service at Big Spring, Texas.

Para-Xylene

★ A New Phillips Product

★ A New Application of
 Refrigeration



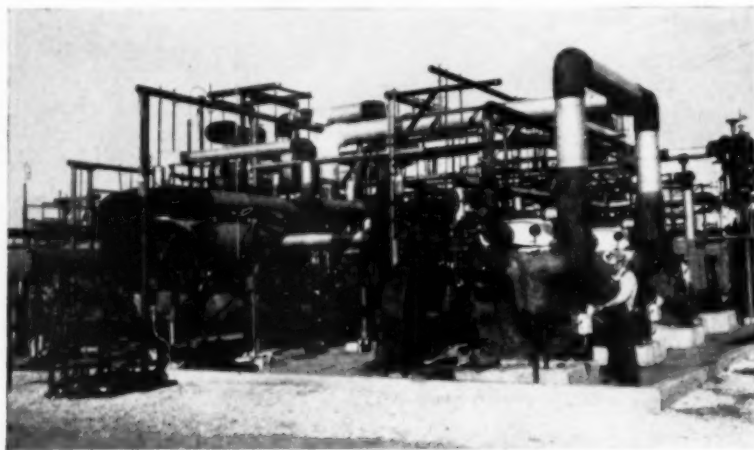
Frick two-cylinder enclosed refrigerating compressor similar to those installed at Big Spring. Also, complete line of "ECLIPSE" multi-cylinder compressors for any refrigerant and any service.

Frick representatives are located in principal cities throughout the U.S.A.



Phillips Chemical Company's new plant near Big Spring, Texas, is the first in the country to produce 98% pure para-xylene (used in the manufacture of a synthetic fibre) in commercial quantities.

The new, revolutionary process, patented by Phillips, involves continuous fractional crystallization. The heart of the system is a Frick "cascade" low-temperature refrigerating plant that FREEZES OUT para-xylene crystals. Whether your process is in the idea, development or production stage—if it involves refrigeration or air conditioning, get in touch with your nearest Frick representative, or write directly to



Singleton Player Co. is Formed in Atlanta, Ga.

Announcement was recently made that the SINGLETON PLAYER COMPANY, 531 Bishop St., N. W., ATLANTA, GEORGIA, has been formed as successor to Wm. H. Singleton & Co., Inc., mechanical specialty contractors for power plants, industrial processes, alloy and non-ferrous piping, certified welding, heating-ventilating, air conditioning, and plumbing.

FRANK PLAYER is president of the new company, and WM. H. SINGLETON and SIDNEY L. CAMP are vice presidents.

Girdler Addition—Ky.

THE GIRDLER COMPANY, LOUISVILLE, KY., has begun the erection of a major addition to its catalyst plant. It is adjacent to the company's activated carbon plant, built in 1952.

The addition is scheduled for completion and use late in 1954, or early in 1955. At that time, Girdler's catalyst manufacturing operations will be consolidated at the new facility, where there is ample room for future expansion.

Girdler began the manufacture of catalysts in 1942. The company's entry into the field was the outgrowth of the activities of its Gas Processes Division, which embraces the design, engineering and construction of plants employing catalytic processes. Girdler's facilities originally produced catalysts for use only with processes offered by the company. But for the past several years, Girdler has been producing catalysts for use with other processes as well.

Girdler catalysts are used for hydrocarbon reforming, carbon monoxide, conversion, hydrogenation, desulfurization and oxygen removal. In addition, special catalysts are manufactured by procedures specified by customers.

The sale of catalysts is supplemented by special technical services provided by Girdler's Catalyst Department. These services include consultation on the utilization of catalysts and unusual plant problems, the development of new and improved catalysts, and the formulation of catalysts to meet specialized needs.

DR. R. E. REITMEIER, director of research and development for the Gas Processes Division, has announced that DR. J. E. TAYLOR has rejoined Girdler after several years' absence, and will be engaged primarily in the development and application of new catalysts.



A pinch of this and that ... won't do!

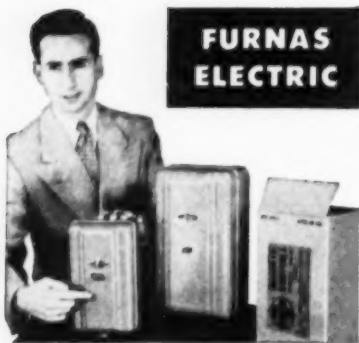
The world's great bakers steer away from grandma's *pinch of this and that* methods . . . it takes superior ingredients combined to exacting recipes to produce perfect results every time.

So, too, with any refractory installation . . . Plibrico gives you all the ingredients for a perfect job: the right products, creative engineering, installation by expert crews. *Only* Plibrico gives you all three . . . but when you call for Plibrico service, you *know* you're getting your money's worth!

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**FURNAS
ELECTRIC**

Why Pay

**FOR STARTER CAPACITY
NEVER USED?**

THE ANSWER TO THIS QUESTION COULD SAVE hard-earned dollars needlessly thrown away.

When choosing from the widest range of starters in the 1-50 hp range, you save by selecting the starter matched to the job—with no wasted capacity.

Furnas Electric starters—nine of them in the 1-50 hp range—are designed and built to match most applications.

**Save 25% TODAY
LIKE THIS**

Here's an example of typical savings you can earn through proper starter selection: for 10 hp service, for example, you'd select Furnas Electric Type YE rated for the job. This saves you up to 25% on initial costs and 40% on space over a YF size 2 (rated 25 hp) normally selected for 10 hp service.

All of the nine Furnas Electric sizes offer worthwhile savings.

Important FEATURES

Furnas Electric starters give you these additional benefits. *Dual Voltage Coils*—matched to motor voltage. *Thermal Overload Protection*. *Shallow Case* for easy wiring. *Durability* to stand up under rough service. *Arc Resistant Terminal Board*. *Arc Quenching Silver Contacts*.

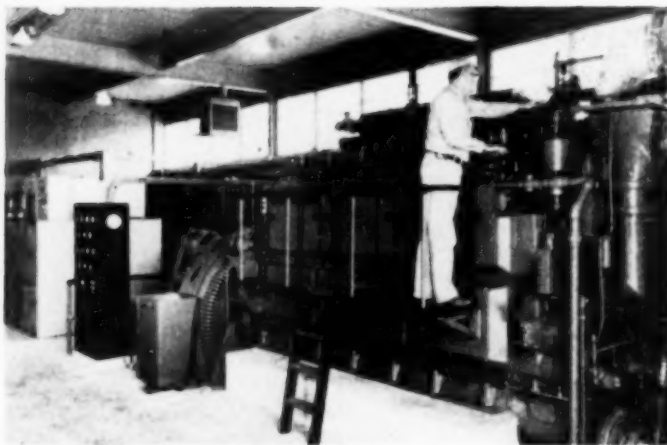
Complete RANGE OF OTHER PRODUCTS

Pressure switches for air and water applications. Drum controllers for reversing, multi-speed and reversing multi-speed service.

Write today for full story or contact our representative near you. Furnas Electric Co., 1047 McKee St., Batavia, Illinois.



News for the South and Southwest (continued)



New Gas Engine Serves Houston Water Works

HOUSTON (TEX.) WATER WORKS places latest supercharged spark ignition gas engine in operation. The new engine, built by Worthington Corporation, is rated at 980 hp, at 600 rpm. It drives a 700 kw E-M Generator supplying power to the pumps augmenting water supply to Houston's industrial area where refineries, chemical plants and other heavy industries have caused a large increase in water demands.

The project, known as the San Jacinto River Project, is part of Houston's plan for shifting from the diminishing well supplies to surface water from the San Jacinto River. There are at present four recently-installed Worthington centrifugal water works pumps with a capacity of over 80 million gallons per day in the potable water distribution system.

American MonoRail—N. C.

THE AMERICAN MONORAIL COMPANY, Cleveland, Ohio, announces the appointment of L. P. HELBERT of its Industrial Division as special field engineer attached to its CHARLOTTE OFFICE for consultation covering material handling problems.

Mr. Helbert attended Rensselaer Polytechnic Institute, and for the past 12 years has been with American MonoRail's sales engineering office.

Teflon—Parkersburg, W. Va.

A project to expand facilities for the manufacture of "Teflon" tetrafluoroethylene resin, one of the newer plastics, will about double present capacity at the DU PONT WASHINGTON WORKS near PARKERSBURG, W. VA.

Principal uses of "Teflon" now are as gaskets, pipe, tubing, tank linings, and valve components in the chemical

industry and as insulation for motors, capacitors, and high-frequency cable in the electrical and electronics industries.

Last month the Du Pont Textile Fibers Department for the first time presented a full description of its experimental "Teflon" tetrafluoroethylene fiber, so resistant to heat and chemicals that laboratory workers dubbed it "dragon fur."

The projected expansion will cover both major forms of "Teflon" tetrafluoroethylene resin—the powders used in making molded articles and the dispersions employed in manufacturing electric wire enamels and coated fabrics.

Since manufacture of the plastic requires a large degree of automatic control, expansion of the present operating force for "Teflon" will be moderate. About 200 construction workers are expected to be employed when the work of putting up equipment reaches its peak.



100 YEARS OF EXPERIENCE IN BUILDING TANKS

FOR a century Cole elevated tanks have provided a dependable water supply for mills and communities. Cole quality is assured by careful, experienced designing and watchful supervision from blueprints to finished tank. Send us your inquiries for tanks from 5,000 to 2,000,000 gallons—stating capacity, height to bottom, and location.

Write for latest catalog — "Tank Talk."

Established 1854

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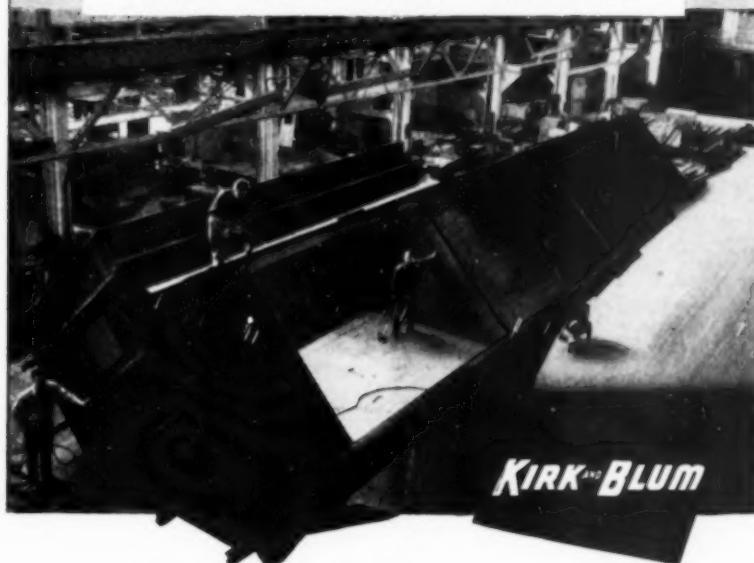
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AIR AND GAS DUCTS



KIRK & BLUM

PLATE FABRICATION FOR POWER PLANTS

Whatever your requirements in fabricated plate, sheet or structurals for power plant use . . . call on experts!

Kirk & Blum has fabricated a variety of power plant needs as big as the mammoth breeching section shown here. In a 150,000 sq. ft. plant, with crane capacity to 25 tons, Kirk & Blum has complete facilities to produce, pre-assemble and load the largest fabrication. Kirk & Blum has the men, materials and experience to do the job quickly and economically.

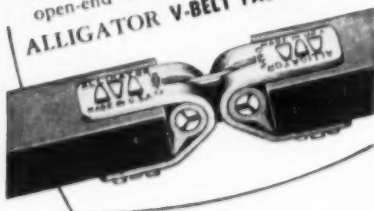
For detailed literature, write:

THE KIRK & BLUM MFG. CO.
3198 Forrer St., Cincinnati 9, Ohio

WHICH V-BELT is best for you?



If the correct size of endless V-Belt is not readily available, or if you have to tear down machinery to install, then the best belt to use is open-end V-Belting fastened with **ALLIGATOR V-BELT FASTENERS**



- ★ In this way you can make up V-Belts in *any length* to fit *any drive* the fast economical way — V-Belts that perform exceptionally well.
- ★ In contrast to link-type belts these ALLIGATOR fastened V-Belts have just *one strong joint* . . . *stretch and follow-up maintenance are reduced to a minimum.*

ALLIGATOR INTRODUCTORY V-BELT



DRIVE UNITS contain V-Belting, Fasteners and Tools — everything you need in one compact package to make up V-Belts quickly. Available in sizes A, B, C & D.

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**ALLIGATOR
V-BELT FASTENERS**

News for the South and Southwest (continued)



World's Largest Circuit Breaker—West Va.

THREE tanks of the world's largest circuit breaker, built by the General Electric Company at Philadelphia, are loaded on two railroad flat cars prior to being shipped recently to the PHILIP SPORN generating station at NEW HAVEN, WEST VIRGINIA. This power plant is owned and operated jointly by THE OHIO POWER COMPANY and APPALACHIAN ELECTRIC POWER COMPANY of the American Gas and Electric System.

The breaker, first ever built to interrupt currents equivalent to 25,000,000 kva, will be installed on the nation's first 330,000 volt power transmission network. The completed breaker will weigh 83 tons and stand more than 25 feet high.

New CP&L Plant—Moncure

CAROLINA POWER & LIGHT COMPANY plans to erect the largest generator in its system as an addition to its Cape Fear River plant near Moncure, N. C.

Work will begin about the first of next year, and the generator is due to go into operation during the second quarter of 1956, according to H. B. Robinson, vice-president in charge of the operations and engineering department.

Dykes along the Cape Fear River at the Moncure plant already have been strengthened and preparatory grading is being done, but that the actual construction project will not begin this year.

The work is part of a post-war expansion budget which already has invested \$117,000,000 and is expected to exceed \$200,000,000 in 1957.

Latest in design, the new Moncure unit will also be the most efficient. Its boiler will raise steam to a pressure of 1800 psi, compared to 900 pounds for the newer units there and 290 pounds for the first units there. Steam temperature will reach 1,000 F.

Cooling water will be pumped through the new condensers at the

rate of 126,000,000 gallons per day. This water will return to the Cape Fear River as pure as it left the river.

Power will be generated at 13,800 volts and stepped up to 110,000 volts for transmission over the CP&L system.

The Moncure plant is located a few miles north of Sanford on the Cape Fear River near the confluence of the Haw and the Deep rivers. The first two units of the plant were installed in 1923 and 1924. Two larger and more efficient units were added in 1942.

Harnischfeger—Louisiana

The HARNISCHFEGER CORPORATION, Milwaukee, Wis., announces appointment of DIXIE MILL AND SUPPLY CO., 901 Tchoupitoulas, NEW ORLEANS, LOUISIANA, as distributor for the complete line of P&H Hoists in Southern Louisiana. They will furnish sales and service facilities of the entire and newly augmented P&H Hoist line. The line now includes chain hoists, jib cranes, and rope-control Zip-Lifts in addition to the standard Hevi-Lifts and push-button Zip-Lifts formerly supplied.

General Cable Names Barnes

ARTHUR Z. BARNES, Southwestern District Sales Manager, has been elected Assistant to the President of GENERAL CABLE CORP. Mr. Barnes will have his headquarters in DALLAS, TEXAS, and will also be responsible for District Sales Offices in St. Louis, Kansas City, Memphis and New Orleans.



Arthur Z. Barnes

Barnes first joined General Cable in 1929 as Dallas District Sales Manager. His entire career has been associated with electrical power, transmission and distribution for utilities, the construction industry, the railroads, the communication industry and many other prominent users of electrical wire and cable.

Air Reduction Builds New Kentucky Plant

AIR REDUCTION COMPANY, INC., has awarded to the Lummus Company the engineering of the recently announced vinyl acetate monomer plant at CALVERT CITY, KENTUCKY. The plant, which will have a capacity of 30,000,000 pounds per year, is scheduled to be in operation early in 1956, by the Chemical Division which is already producing a number of new chemicals derived from acetylene, including a series of acetylenic alcohols and glycols, methyl acetylene and vinyl stearate.

The new vinyl acetate monomer plant is the latest of a group of chemical plants at Calvert City based on pipeline acetylene from Air Reduction's National Carbide Division. The B. F. Goodrich Chemical Company is already producing vinyl chloride at this location and is building a plant for acrylonitrile. The General Aniline and Film Corporation has recently announced a plant for production of high pressure derivatives of acetylene.

FOR CONTROLLING TEMPERATURE OF LIQUIDS OR GASES

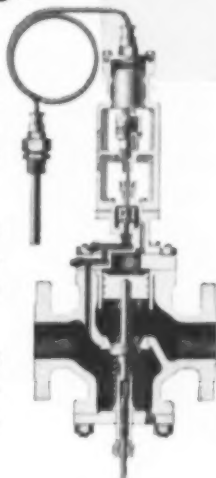
TEMPERATURE REGULATORS

FOSTER TYPE T

Foster manufactures a complete line of temperature regulators for all types of service — for hot water storage heaters, fuel oil heaters, pasteurizers, ovens, driers, cookers and other process heating and cooling equipment.

They are available in single or double-seated construction; direct or reverse acting; in combination with pressure reducing valves; and in proper materials for the type of service.

Like all Foster valves, they are designed and built for long life with a minimum of maintenance, and are easy to service when necessary. Ask for Bulletin T-101.



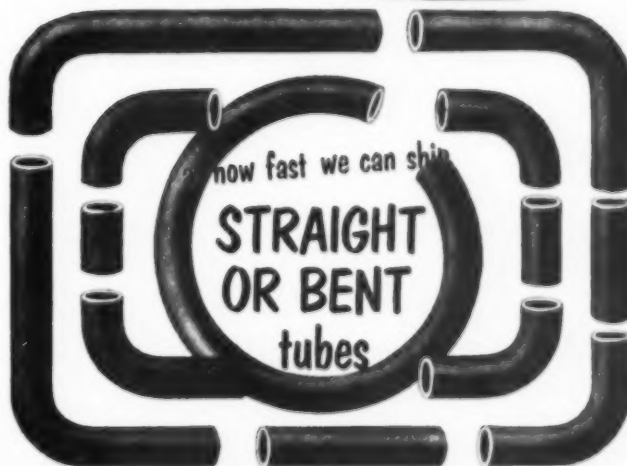
FOSTER ENGINEERING COMPANY

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AUTOMATIC VALVES • SAFETY VALVES • FLOW TUBES

You'll be aMAZEd...



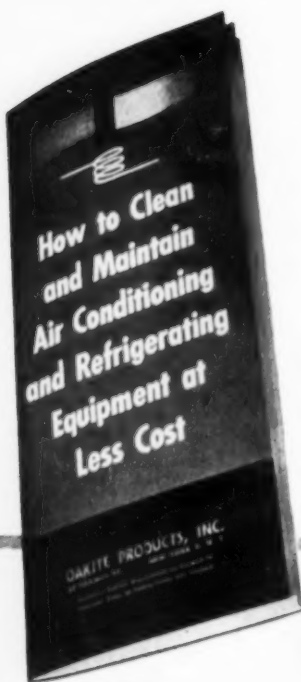
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**STRAIGHT
OR BENT
tubes**

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MATERIALS • METHODS • SERVICE

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News for the South and Southwest (continued)

Black & Decker Promotes Three to Vice-President

ALONZO G. DECKER, President of THE BLACK & DECKER MFG. CO., TOWSON, MARYLAND, has announced election of the following to vice-presidencies:

R. G. HORNER, Vice-President—Sales Planning; ADAM QUICK, Vice-President—Production; and J. F. SPAULDING, Vice-President—General Sales Manager.

Mr. Horner joined the Company in 1917 and has progressed through the positions of repairman, salesman, Chicago Branch Manager, and Central District Sales Manager to his new position, which will place him in charge of all sales planning and merchandising activities at the Company's Headquarters at Towson.



Adam Quick

Mr. Quick joined the Company in 1935 in the manufacturing division and has served as department foreman, head of Methods Department, and Assistant to the Vice-President in Charge of Manufacturing. His new position will make him responsible for all the Company's production activities at its Towson and Hempstead plants.

Mr. Spaulding joined the Company in 1926 as a salesman and has advanced through the positions of Buffalo Branch Manager and General Sales Manager to his new position, in which he will be responsible for the Company's sales activities in the United States and Canada.

Coyne Cylinder Plant—Tenn.

Operations began in August for the new \$150,000 plant at MEMPHIS, TENN., for COYNE CYLINDER CO. of San Francisco. The 28,000 sq ft building houses both production facilities and offices.

L. W. FLEISCHER, general manager of the firm, has been named to direct sales and manufacturing operations of the new plant, which produces acetylene cylinders for general industrial use.

Georgia Power Dedicates Sinclair Dam Power Plant

Dedication exercises were held at Sinclair Dam, GEORGIA POWER COMPANY'S 45,000 kilowatt hydroelectric generating plant on the Oconee River near Milledgeville, July 28.

B. W. SINCLAIR, distinguished Georgia citizen and manager of production for the power company, in whose honor the plant is named, was present along with company and state and local government officials.

Work on this newest and most modern hydroelectric power plant in the Georgia Power system was first undertaken by the company in 1929, but was discontinued later because of the business depression. Construction was resumed in 1949 and the plant was completed in February, 1953.

Sinclair Dam was built at a cost of more than \$14,000,000.

The two units in the power house, each with a capacity of 22,500 kilowatts, will produce a total of 165,000,000 kilowatt hours of electricity in a normal year.

The dam site is 2,988 feet in length and 105 feet high. The lake created behind the dam has a shoreline of 417 miles and covers an area of 15,330 acres. Plans have been developed by the company to turn Sinclair Lake into one of the state's outstanding recreational areas.

Winder Aircraft—Georgia

THE WINDER AIRCRAFT CORPORATION, WINDER, GEORGIA, is working on a long range program in the electronic and guided weapons field which will carry forward for a period of several years.

At present the company is acquiring a quantity of specialized electronic research and test equipment, as well as hiring a number of engineers and technicians.

The firm has current manufacturing contracts with the U. S. Air Force and U. S. Army for specialized electronic products, as well as supply contracts with the U. S. Air Force and U. S. Army. Contracts now in production and in preparation carry through most of 1955.

Using Woven Wire Conveyor Belts?



get to know your Cambridge man!

Every Cambridge Sales Engineer—both in the field and the home office—is thoroughly trained in every phase of wire belt engineering.

That means he's equipped to give you complete, accurate advice and recommendations—based on our years of leading the development and applications of woven wire conveyor belts. You can be sure that the belt he recommends for you will give top performance, because every Cambridge belt is selected and fabricated to meet individual requirements. No two belts are alike. The belt you buy is designed for you alone.

Moreover, every step of belt fabrication at the plant is closely inspected to make sure the finished belt meets rigid specifications for size, mesh count and mesh opening.

So, for complete satisfaction with belt performance—get to know your Cambridge man. He's listed under "Belt-Mechanical" in your classified phone book—or write us direct.

IF YOU'RE NOT USING WIRE BELTS let us tell you how they can boost production and cut costs by combining movement with processing. No obligation, of course.

FREE CATALOG

Gives complete specifications for Cambridge wire belts, provides you with background knowledge for discussion with your Cambridge Sales Engineer.



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Wire Cloth Co.**
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WIRE CLOTH METAL CONVEYOR BELTS SPECIAL METAL FABRICATIONS
OFFICES IN LEADING INDUSTRIAL AREAS

Barber-Colman—Alabama

The Automatic Control and Uni-Flo Division of BARBER-COLMAN COMPANY has opened a new branch office at 2807 Central Avenue, BIRMINGHAM 9, ALABAMA, under the management of Mr. STANLEY SIMPSON.

New Company Offers "Package" Job for Industry—La.

U. S. INDUSTRIAL ENGINEERS & CONSTRUCTORS is a large engineering and construction company recently formed at NEW ORLEANS to offer a complete "package" job for industry, including financing, site location, design, engineering and construction.

Companies participating in formation of the new unity are THE R. P. FARNSWORTH & COMPANY, INC.; THE JAMES F. O'NEIL COMPANY; THE WALTER J. BARNES ELECTRIC COMPANY; and DE LAUREAL & MOSES, Consulting Engineers. Their combined resources total \$5,500,000. Their present proposal is to work as a unit and deliver a "turn-key" job. Personnel and equipment of the new unit is adequate for all requirements.

A. O. Smith—Alabama

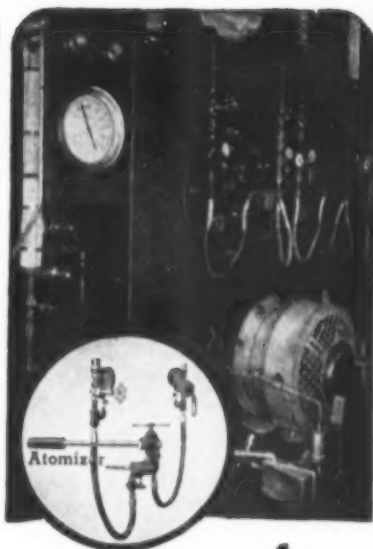
OWEN FORD has been assigned as sales engineer by the Welding Products Division of the A. O. SMITH CORP., to be located in BIRMINGHAM, ALA., and cover Tennessee, Mississippi, Alabama, Georgia and Florida. He formerly was with the company at Houston.

The Welding Products Division also announces the appointment of MIDWESTERN PIPELINE PRODUCTS CO., 5005 Peachtree Rd., Chamblee, Ga., as distributor.

Mercury—Virginia Appointments

THE MERCURY MANUFACTURING COMPANY, manufacturers of material handling equipment, has appointed ASSOCIATES AGENTS, INC., Greensboro, North Carolina, as their representative. Their territory will include the states of North Carolina and South Carolina.

The Greensboro firm is headed by J. H. (TOM) AYDELETTE, who until recently was associated with the Slaughter Machinery Company, a Manufacturers' Agent. Mr. Aydellette will be assisted by Jesse B. Bateman in the sales and service of Mercury equipment in this area.



*Efficient
combustion*
with

Enco Burners

FOR ALL GRADES OF LIQUID FUEL

Enco Burner Units of Steam or Mechanical Atomizing Types are made in various sizes with capacities from 1 to 1000 gallons per hour.

Designed for operation either with or without air registers and for natural or forced draft.

The Enco Interchangeable Atomizer is made for instant change of guns for operation by either steam or mechanical system or to cover a wide range of capacity.

Enco Atomizers are used with various types and makes of pulverized coal and gas-burner units to provide a dual fuel unit for cold starting, or for full-load operation when coal or gas is not available, or use when oil is the more economical fuel.

We have made many installations during the past 25 years and are ready to cooperate with those looking for better operation and assurance against loss of steam output.

THE ENGINEER CO.

Enco

75 West St.
New York 6, N. Y.

Good Housekeeping Makes Money for Maryland Plant

(Starts on page 80)

uals are designated on a rotation basis to be responsible for housekeeping within their respective areas, and they are strictly held accountable for such.

Maintenance personnel, of course, subsequently dispose of the rubbish and waste material in bulk. Direct supervision directs, or authorizes, such work to be done when it appears to be either desirable or advisable. A standing "cleanup" account is available and used for this. Production management makes it a point to observe and comment to supervision on housekeeping aspects on most all of its daily trips through various parts of the plants.

Such utilization of direct-labor hours is more than offset by the gain in efficiency due to improved working conditions and in housekeeping psychology, which in the final analysis are reflected in a

net gain in dollars in our opinion. This practice illustrates in a very concrete way our management's firm belief in the economic aspects of good industrial housekeeping. The psychology behind this practice is self-evident. A worker who tends toward disorder or carelessness or indifference, after he comes to know that it will likely be he himself, not someone else, who will have to straighten up his disorder and clean up his debris and rectify his carelessness, soon learns by his own instincts to exercise more care, to think ahead, in his operations and actions. The practice clearly encourages care, and voluntary better housekeeping. The production personnel in their respective areas are in a better position than maintenance people to use more intelligent care in cleanup and to discern whether

material is re-usable or should be discarded.

But in spite of these efforts directed toward good housekeeping—like the best laid plans of mice and men—there occasionally develops a case of substandard housekeeping within some area. There is an award for that, too. This is called the "Hog Award." It is a large sign of some 6 ft by 4 ft, painted on both sides, showing a typical hog pen with litter about, and the wording "This is the Sloppiest Department in the Plant." When awarded, it is hung high over the unfortunate department's area without advance notice, in full view for the world to see. It does not have to be used too often, but when it does, it is rather reluctantly "awarded," and only after sufficient instructions have been given to normally effect improvement. But it takes effect quite promptly, as recipients, suddenly becoming sensitive to what others think about them, seldom enjoy keeping it for more than a few days.

This approach, of course, is quite negative, and so is the substandard condition which prompts its use. But as distasteful and negative as it is, it is unquestionably positive in results.

We also have in constant use one other form of reminder—this one being of a positive character and having to do with the safety aspects of good housekeeping. At each department station in the factory a sign is conspicuously displayed reading, "This Department Has Operated (so many) Days Without a Lost-time Accident." It is kept up to date daily. This is intended to, and apparently does, perpetuate a running consciousness of the need for everyone to continue to exercise care, one element of which our people know applies to housekeeping.

Those are the main approaches we take at our plant. But regardless of the particular methods chosen to be used in any plant, two cardinal principals should be remembered unceasingly:

First, genuine good industrial housekeeping is a matter of economics, of planned order, reaching into the background of all



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thinking and action throughout the organization, with full comprehension of the efficiency and safety aspects as well as those of appearance.

Second, it must be treated, without relaxation, as a living thing.

Our management is sufficiently confident that a factory having such housekeeping is superior in efficiency and safety that it deliberately has spent and continues to spend good hard money to achieve it and preserve it, for good housekeeping is one of the easiest, most gratifying, and most inexpensive ways of making money. Like the assets of good will, prestige, credit, or good standing—for which businesses pay out good money because they pay dividends—the value of good industrial housekeeping may be invisible, but it is nonetheless real.

Books for the Plant Engineer

Introduction to Nuclear Engineering

By RAYMOND L. MURRAY

PUBLISHED BY PRENTICE-HALL, INC.
70 Fifth Ave., New York, N. Y.

418 pages

Price, \$9.35

Reviewed by John F. Lee, Consultant
on Atomics for Southern Power &
Industry.

This book is the first to appear in the new field of nuclear engineering. The author, a professor of physics at North Carolina State College, has done a remarkably good job of presenting the basic principles of reactor theory and design in simple language which is intelligible to the engineer who has had no more than a college course in general physics.

An introductory chapter reviews briefly many of the important principles of modern physics. Succeeding chapters are devoted to the properties of neutrons, fission and chain reaction, separation of isotopes, plutonium production, nuclear reactor principles, the water boiler, reactor start-up and operation, materials of reactor construction, principles of heat transfer and fluid flow, design of gas-cooled enriched uranium reactor, design of

liquid-metal natural-uranium reactor, radiation hazards, shielding, radioactive waste disposal, detectors and control instruments, neutron experiments, uses of radioactive and stable isotopes, nuclear propulsion of aircraft, submarines, and rockets, and electrical power from fissionable fuel.

The book suffers from a number of handicaps. Much vital information in connection with reactor design has not been included presumably because of security restrictions. However, this should not be a matter of concern for the engineer who is merely interested in background information. The chapter on heat transfer and fluid flow is especially weak probably for the reason that these two subjects cannot be adequately treated in a brief chapter. One is surprised to find a section on flow of fluids through particle beds in such a sketchy chapter. The chapters on propulsion systems and power plants are not only inadequate but are somewhat fanciful. The chapter on detectors and control instruments is inadequate. Fortunately, these shortcomings are restricted to material which is already familiar to most engineers. They merely emphasize the hopelessness of

attempts to present as a single course what is in fact a major portion of a curriculum.

This reviewer recommends that engineers promptly acquire a copy of this book to supplement their previous education in preparing for the important work which lies ahead in this field.

Lubrication of Industrial and Marine Machinery

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By C. L. POPE AND W. T. EVERITT
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N. Y.

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U-2 PRESSURE WASHER—Bulletin, 4 pages—Describes Hydro-Air Cold Steam Pressure Washer, with photographs of equipment and applications in all types of industry. Includes specifications and other engineering data.—D & M PRODUCTS, INC., 26 N. Raymond Ave., Pasadena, Calif.

U-3 GAS BURNER—Form No. 156, 6 pages—Illustrates and describes the Tru-Radiant gas burner with Demandrol for use in all types of steel, cast iron and brick set boilers and furnaces, under all operating conditions. Diagrams show construction features, and table gives capacities.—GORDON & PIATT, P. O. Box 331, Winfield, Kans.

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U-13 MATERIALS HANDLING—Booklet No. 2068-K, 12 pages—Describes overhead materials handling equipment including various track drives, cranes, electrification, buckets, grabs, etc., with illustrations of equipment and applications.—CLEVELAND TRAMRAIL DIVISION, THE CLEVELAND CRANE & ENGINEERING CO., 8052 E. 289th St., Wickliffe, Ohio.

U-14 COLD CATHODE LIGHTING—A.I.A. File 31-F-21, & 31-F-21 Industrial, 4 pages each—Bulletins explain cold cathode, objectives, applications, and advantages for use in industrial plants. Celine lamps are described, and fixture data is included.—CELINE, INC., St. Charles, Ill.

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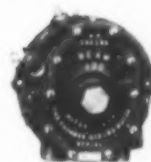
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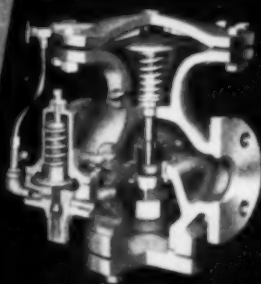
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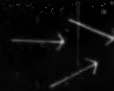
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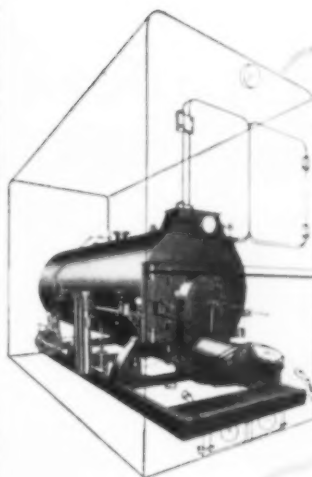
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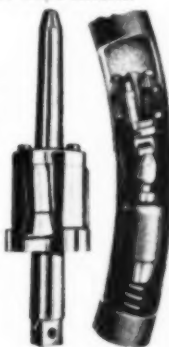
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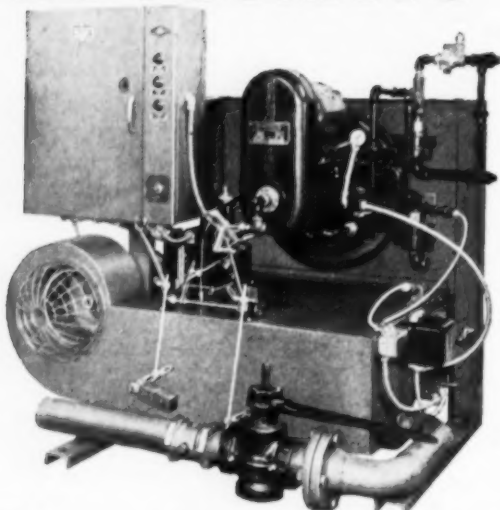
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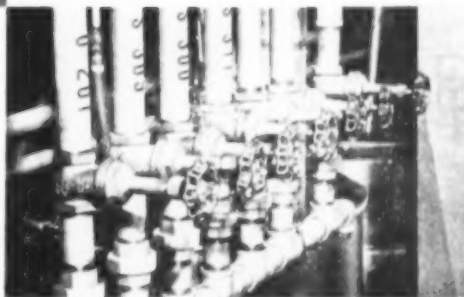
Symbolic of the advanced design principles that guided the building of the Johnson's Wax Administration and Research Center at Racine, Wisconsin, is the world-famed core-supported Research and Development Tower. Designed by Frank Lloyd Wright, this modern, 14-story laboratory provides every facility known to science for the continuous development and improvement of Johnson's Wax products.

The efficient use of space to provide open, well-lighted working areas in modern industrial structures necessitates careful planning of various plant service lines. In the world-famed Johnson's "Heliolab", for example, all piping and duct systems are standardized vertically in a single central shaft measuring 13 feet in diameter. Thus, pipelines serving plumbing and heating, air-conditioning, and all apparatus supply needs are confined to a minimum of space. Direct takeoffs at each of the 14 operating floors eliminate the complex hookups usually found in laboratory buildings. More than 1700 valves are used in tower service lines.

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